AVIATION WEEK

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JAN. 14, 1952

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The elaborate radar gear of the Northrop Scorpion F-89, the Air Force's top all-weather jet interceptor, makes it possible to shoot down enemy aircraft never even glimpsed.

The fog and darkness that hamper ordinary fighter operations can't stop the pilot of the F-89. Because after an intruder has shown up clearly on his radar screen, automatic tracking equipment takes over and, together with the computors, quickly tells him in which split second to fire – for a direct hit.

Playing an important part in the tracking operations are extremely sensitive rate gyros. Now being mass produced for manufacturers of radar search equipment, this small Honeywell gyro recognizes the rate of target motion and stabilizes the antenna "on target." It is light enough and compact enough to be mounted on the antenna. And another Honeywell gyro development for radar tracking equipment – the "twin-spin" – soon will be in production for non-antenna mounting.

Honeywell, one of the leading gyro manufacturers, specializes in this important field.

And Honeywell engineers will continue to experiment, improve and find new applications for gyroscopic controls. We plan to broaden our research in this and other fields of control – because *automatic control* is such an important part of aviation progress. And *automatic control* is Honeywell's business.

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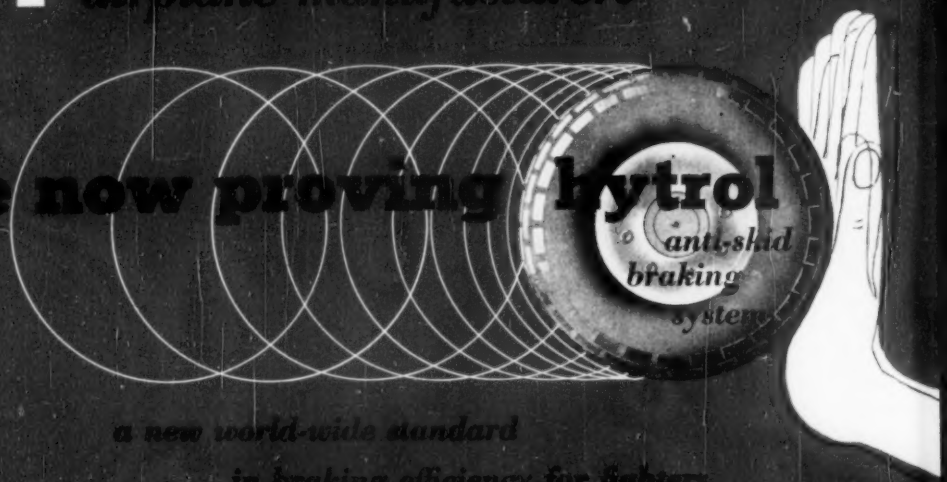

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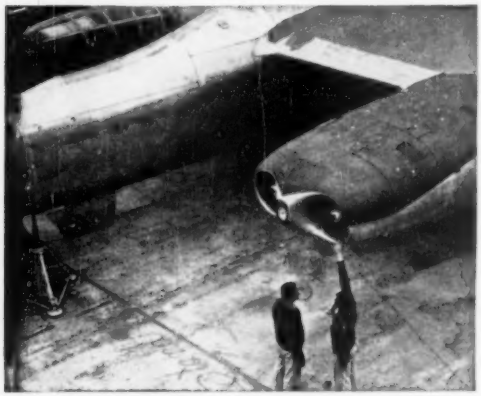

4 hot ideas for fighting ice

The pipe that flies like a plane. Boeing's new Flying Boom for in-flight refueling (upper left) is actually flown into place by means of vee-shaped ruddevators. To provide accurate control, these ruddevators had to be protected against ice. B. F. Goodrich developed special electric rubber pads for the leading edges that supply spot anti-icing heat.

Electric blankets keep new Arctic plane from freezing. Designed for Arctic rescue work, Northrop's new C-125 (upper right) had to have ice protection at all vital spots. BFG electric rubber "blankets" turned the trick for three parts—antenna mast, elevator horn and air scoops. Because of the design flexibility of electric rubber, wide variation in the shape of these three parts proved no obstacle.

Keeps ice from choking jet's throat. Ice forming in the narrow "throat" of a jet engine intake could choke off the air supply, make the engine quit cold. This threat has been eliminated on North American's B-45 (lower left) with a special lining of BFG electric rubber inside the cowl.

Rubber makes gasoline stretch. To help flight engineers adjust fuel supply for maximum efficiency, a hydraulic line transmits propeller load to an instrument panel dial. But cold was congealing the oil, causing false readings. BFG engineers sheathed the hydraulic line in electric rubber to keep the oil fluid, save gasoline. This heated line is now standard on TWA Constellations (lower right).

B. F. Goodrich electric rubber is tough, thin rubber with a core of resistance wires that provide spot heat precisely as needed. Two lead wires attached to the airplane's regular power supply are the only other equipment required. Electric rubber can be made to fit any size, any shape airplane part. For help with your problems write to *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

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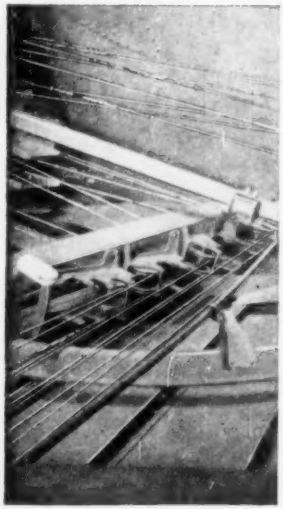

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Aviation Week

ABP Member ABC

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NEWS DIGEST

DOMESTIC

DC-6A scheduled cargo service was slated to be inaugurated between New York and San Juan, Puerto Rico, by Pan American World Airways Jan. 10, using planes leased from Slick Airways. The new service links Europe to the U.S., to the Caribbean and to South America since it ties in with PAA's DC-6A cargo run opened to Europe Jan. 5. Latest service leaves New York on Thursdays, Puerto Rico on Fridays.

First production AU-1 Corsair, designed for ground support, has been flown by Chance Vought, Dallas. Similar to the familiar F4U, the new AU-1 has a single-stage P&W R-2800, additional armor plate to protect pilot from ground fire, and a number of internal modifications. More than 12,000 Corsairs of all models have been built since the first prototype.

Capt. John R. Poppen, Medical Corps, USN, director of the Navy's newest medical acceleration laboratory at NADC, Johnsville, Pa., has retired from active duty. He had done much in development of pilot ejection seats, anti-acceleration belts, G-suits and other aviation medicine research.

Civil aircraft shipments came to 227,300 lb. last October, measured in airframe weight. Total included 124 planes, valued at $3.8 million. Backlog of planes, 3,000 lb. and over, came to 700 at the end of the month. During October, 343 engines aggregating 190,600 hp. were shipped. Aircraft plant employment was 331,102; workers in engine plants numbered 63,430.

Frederick A. W. Stiefler, 36, has been named assistant public relations director of Aircraft Industries Assn., in charge of the western office, as a member of the Los Angeles staff of Hill & Knowlton, Inc. Stiefler was former director of public relations for Bethlehem Pacific Steel Co., is a pilot and has been active in California civil aviation affairs. He attended Kenyon College and Tri-State College, and is a chemical and mechanical engineer. He succeeds Gaither Littrell who resigned from the AIA public relations post.

Gill Robb Wilson, aviation columnist for the New York Herald Tribune, has joined Flying magazine as editor and publisher. World War I pilot, one of the organizers of the Civil Air Patrol, Wilson also helped establish the National Association of State Aviation Officials and the Aircraft Owners and Pilots Assn., was four-time president of the National Aeronautics Assn.

FINANCIAL

National Airlines reports a net income of $125,200 after taxes for last November, a 12.83% gain over the same period the previous year in spite of increased taxes. Total operating revenues during November were $2,262,456, a 43.11% gain over the same period in 1950. Carrier has declared 25-cent dividend to stockholders of record Jan. 14.

Rohr Aircraft Corp., Chula Vista, Calif., had net sales of $26,223,548 for the fiscal year ended July 31. Net profit was $968,107. Employment is now 5,000; backlog over $100 million.

Lear, Inc., Grand Rapids, Mich., ended 1951 with shipments volume close to $21 million, a 163% increase over 1950. Current backlog is about $40 million.

AiResearch Mfg. Co., Los Angeles, had gas turbine engine backlog boosted to nearly $50 million when firm received additional $11-million order for shaft-power versions to drive alternators on the Martin P5M-1 Marlin and Chance Vought F7U Cutlass.

Delta Air Lines reported 1951 operating profit estimated at $4,585,000, more than double 1950, with net profit after taxes of $1,926,000 compared with $1,147,000 in 1950, or $3.85 a share compared to $2.29.

INTERNATIONAL

Canadian government placed $3,385,000 worth of aircraft parts and accessories contracts during the last two weeks of November, with largest single order going to de Havilland Aircraft of Canada, Ltd., Toronto, for engine and airframe spares amounting to $1,420,000.

British Commonwealth Pacific Airlines jointly owned by British, Australian and New Zealand governments, has received approval of all three to purchase six DH Comet jet airliners for its trans-Pacific services connecting Australia and New Zealand with the U.S. and Canada. The BCPA planes will probably be Avon-powered Series II Comets seating 44 and delivery will be in 1954-1955. Order will come to $8.4 million without spares or equipment.

Sixth DH Comet made its first flight at Hatfield, on Dec. 31.

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Models R-220 and R-174 are identical in performance, but differ in mounting arrangements.

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AVIATION CALENDAR

Jan. 16—AIA Starter Panel Meeting, Hotel Statler, New York.

Jan. 18—American Rocket Society meeting. Dr. M. J. E. Golay, chief scientist of Squier Signal Lab., Ft. Monmouth, will speak on "Radio Ranging in Outer Space." Engineering Society Auditorium, W. 39 St., New York, 8 pm.

Jan. 21-25—American Institute of Electrical Engineers winter general meeting, Hotel Statler, New York.

Jan. 22—Meeting of Institute of the Aeronautical Sciences, Cleveland-Akron Section; talk, "Freight by Air," by T. L. Grace, president of Slick Airways, Cleveland.

Jan. 22—International Air Transport Assn. Technical Committee meeting, Madrid.

Jan. 22—AIA Engine Technical Committee meeting, Hotel Lexington, New York.

Jan. 28-Feb. 1—20th Annual Meeting, the Institute of the Aeronautical Sciences, Astor Hotel, New York.

Jan. 29-31—114th National Meeting of the American Meteorological Society, Roosevelt Hotel, New York.

Feb. 7—Meeting of Society of Automotive Engineers, Igor I. Sikorsky will speak on helicopter programs. Brass Rail Restaurant, 5 Ave. near 43 St., New York.

Feb. 7-8—Regional meeting of Instrument Society of America, Power Plant Symposium, Hotel Statler, New York.

Feb. 14-15—AIA National Aircraft Standards national meeting, Hollywood Roosevelt Hotel, Los Angeles.

Mar. 3-6—Institute of Radio Engineers, Waldorf-Astoria Hotel & Grand Central Palace, New York.

Mar. 3-7—Spring meeting of American Society for Testing Materials, symposium on testing metal powders and metal powder products, Hotel Statler, Cleveland.

Mar. 14—National Flight Propulsion Meeting, Institute of the Aeronautical Sciences, Cleveland.

Mar. 17-19—Second Midwestern Conference on Fluid Mechanics, to be held at Ohio State University.

Mar. 17-21—American Society of Tool Engineers industrial exposition and annual meeting. Theme: "Tooling for Security." Chicago. (For information, write Denham & Co., 812 Book Building, Detroit.

Mar. 30-Apr. 3—Convention of American Association of Airport Executives, Ft. Worth.

April 21-24—National Aeronautic Meeting and Aircraft Engineering Display, Society of Automotive Engineers, Hotel Statler, New York.

May 8-9—Fifth annual Wisconsin Aeronautics Conference, Green Bay.

June 9-21—Triennial meeting of International Organization for Standardization; host will be American Standards Assn.; Columbia University, New York.

PICTURE CREDITS

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Washington Roundup

What's Ahead in Congress

Air power will be tossed about in political cross currents in this session of Congress.

Political lines aren't rigidly drawn on the issue, but generally this is where the contending forces stand now:

Truman supporters want to "go slow" on the air power build-up. They're worried at its cost. They favor increasing emphasis on tactical and medium-range bomber air, less on long-range strategic air, in line with the Administration's foreign policy of "going it with neighbors."

House Appropriations Committee's Chairman Clarence Cannon set the tone: The Administration's defense budget will be "very tight" but Congress will crop it even closer.

Cannon's comment: "Last year we gave the Joint Chiefs of Staff everything they wanted. We had no other choice. Joe Stalin was ready and we weren't ready. We had to vote a blank defense check. This year things are different. We are not out of the woods completely, but Stalin has missed the bus. From now on, time will be working in our favor. The military already have a lot more than they have been able to spend. We have the leisure now to take a look at the money and what was done with it."

Taft forces will try to outdo the Administration in lowering the ceiling on defense spending generally. They'll talk up strategic air power, though. It dovetails with their conviction that the U. S. should "go it alone"—or at least be prepared to.

Eisenhower forces, led by Sen. Henry Cabot Lodge, want more defense and faster—with cost and effects on the civilian economy secondary considerations. Particularly, they'll fight for more air power: Priority for tactical air because of the present deficiency, but also a bolstering of air defense and strategic air.

Outcome: After long hearings and much debate, Congress probably belatedly will approve somewhat less than the $50-billion Truman defense program for the coming year, cutting slightly funds for Air Force and Naval air.

How Much Air Power?

• **What Size Air Force—in Theory?** Congress should determine the "authorized" size of USAF, but probably won't. The reason: Consideration would open the floodgates for controversy over military policy.

The law being overlooked authorizes a USAF of "not to exceed 70 groups." Department of Defense has asked for simple repeal; House Armed Services Committee's Chairman Carl Vinson has put forth legislation setting a 143-wing authorization for USAF.

Vinson has shown no inclination to act on the matter, though, since members of the committee announced they will insist on a thorough airing of the USAF strategic and tactical air programs at hearings.

• **Maximizing Air Power. Defense Department shortly will submit an overdue report to Joint Congressional Atomic Energy Committee detailing plans to "maximize" the use of atomic weapons. That means maximizing air power: Aircraft are the only present operational vehicles for delivery of atomic attack.**

If the Committee isn't satisfied with the report, there may be hearings to pressure defense into streamlining military structure to fit the atomic era. Navy would welcome the opportunity to present its case: That mobile carrier-based aviation is ideally adapted to deliver atomic retaliation at any point on the globe.

Taxes and Subsidies

• **Less Tax Easement on Defense Plants.** Congress is likely to spell out stiffer requirements for tax easement on new defense plants and authorize less easement than the present provision for quick five-year amortization.

• **No More Taxes. Administration's plan for a boost in the corporate tax rate from 52 to 55% and a raise in the gasoline tax from two to three cents a gallon isn't likely to get through Congress.**

• **Airmail Postal Increase. Airlines will have to put up a stiff fight to ward off an increase in the airmail rate of six cents an ounce. It's definite that Truman will request postal rate increases to wipe out some of Post Office's $500-million-a-year deficit. Even if he doesn't include a boost in airmail, there's certain to be a strong drive in Congress for it.**

• **Subsidy separation from mail pay** probably will be taken up by House Interstate and Foreign Commerce Committee in about a month. There will be a drive to tighten the Senate-passed Johnson Bill.

The main fight over the Johnson Bill's provision setting the Universal Postal Union rate of $2.86 a ton mile as the compensatory mail rate for international carriers. Kennedy faction claims this includes a big slice of subsidy. They want international rates, as domestic rates, to reflect cost-of-service plus a reasonable profit. Postmaster General Jesse Donaldson sides with them.

Civil Air

• **Cut in Civil Air Funds.** Even if Civil Aeronautics Administration puts up a fight, its funds will be sharply cut. Civil Aeronautics Board's smaller budget will be a lesser target of Congressional economizing.

• **Airline Subsidies.** Post Office funds for airline subsidies will get rough treatment by appropriations committees. But the big fight of the airlines for subsidies won't come until next year—after legislation requiring a separate appropriation is enacted.

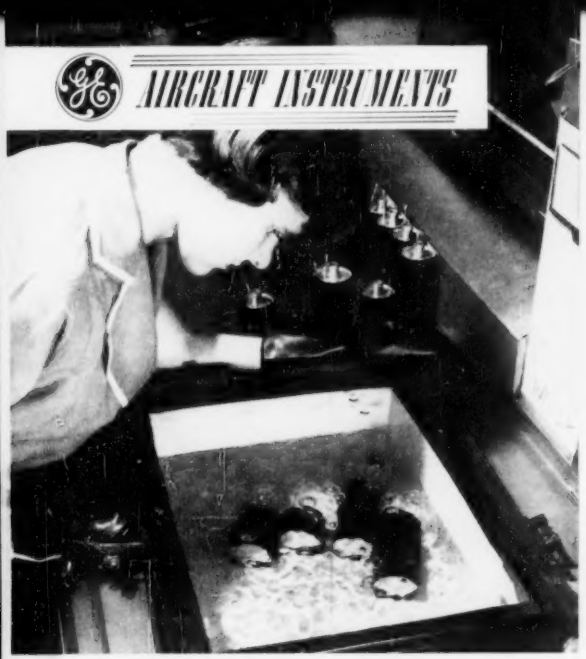
• **Prototype Testing Funds.** Outlook for government funds to launch the $12-million authorized program for testing commercial prototypes is dim. Congressmen who have supported government-financed testing of jets for commercial use now feel that if the big airlines can finance the development of a plane they can also finance its testing.

• **Jet Construction Subsidy.** Hearings will open in a few weeks before Senate Interstate and Foreign Commerce Committee on Sen. Pat McCarran's proposal for a construction differential subsidy to assure that U. S. international carriers can buy jets as cheaply as their foreign competitors. It's likely to get lost in controversy.

Correction

In Washington Roundup of AVIATION WEEK, Dec. 31, p. 9, the U. S. target of productive capacity was stated as: "50,000 planes and 18,000 jet engines a year." The statement should have read: "50,000 planes a year and 18,000 jet engines a month." —Katherine Johnsen

AIRCRAFT INSTRUMENTS



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WHO'S WHERE

In the Front Office

Arthur E. Flood has been elected executive vice president of Fairchild Engine & Airplane Co. A director, Flood will also continue to serve as company comptroller. He has been with the firm since 1928, was made vice president-comptroller in 1949 during a management reorganization.

E. T. Wood has been appointed administrative assistant to the president of Trans-Canada Air Lines. Formerly director of facilities and supply control, Wood joined TCA in 1937 as secretary to the vice president.

E. V. Rippingille, president and general manager of General Motors Diesel Ltd., London, Ontario, has been named aircraft production chief for Canada in the Department of Defence Production, Ottawa.

Changes

Edgar H. Atkin, formerly chief engineer for Avro Canada, has been given the newly created post of technical director of the Aircraft division. **James C. Floyd** steps up to become chief engineer and **Dennis E. Wiseman** becomes works manager. **Fred T. Smye,** a director of the company, has been given a newly created position, that of general manager of the Aircraft division.

C. P. Grady has been designated assistant to the manager of foreign sales for Douglas Aircraft Co., Inc., and David Downey has been named to assist the company's domestic commercial sales manager. **J. R. McGowen** has been appointed chief project engineer on the DC-6 and DC-7, filling the vacancy created when **J. B. Edwards** left to become chief engineer for Hiller Helicopters.

M. A. Wachter has been named division manager-manufacturing with Pacific Automotive Corp., with **D. R. Wetmore** appointed as his assistant.

Bill Schurr has been designated public relations administrator for Piasecki Helicopter Corp., Morton, Pa.

W. T. W. Ballantyne, formerly SBAC representative in South America, has joined Armstrong Siddeley Motors to act as liaison with firms using these powerplants.

Willis P. Domkin has been appointed advertising manager for Panagra Airways.

Ralph E. Rechel, formerly CAA's budget officer, has been made economic analyst for the Air Transport Assn.

Donald B. Talmadge, previously with NACA for eight years, has been appointed to the engineering and maintenance staff of Air Transport Assn.

Ford Eastman, newsman, has joined Northwest Airline publicity department and news bureau in St. Paul, Minn.

J. R. Williams has been promoted to superintendent of stations for All-American Airways and **I. B. Sperry** has been named assistant director of stations for AAA.

John S. Beard has been designated director of personnel for Pacific Northern Airlines.

INDUSTRY OBSERVER

► Dynamic lateral stability many times greater than normal is said to be provided, with no controllability loss, through the use of a new side-slip stability augmenter device developed by Northrop Aircraft Inc. for incorporation on its F-89 Scorpion all-weather fighter. Device uses a low threshold accelerometer to measure side force on the aircraft. An electric servo deflects the rudder to neutralize the side force. It is said to make possible coordinated sharp or slow turns without use of rudder pedals. However, full rudder is available for deliberate sideslips. Device is considered an answer to the lateral motion known as Dutch Roll, without increasing size of the plane's tail. Result is a steadier aerial platform for rocket or gun firing. Device already has been flight tested at Edwards AFB on the F-89.

► **Convair's YB-60 sweptwing eight-jet development from the B-36 design and competitor to the XB-52 incorporates about the same amount of magnesium as used in the current B-36D, approximately 9,000 lb.**

► Although the USAF knocked the McDonnell XF-85 parasite fighter project in the head sometime back, it has not entirely given up this concept of protecting its long-range bombers from enemy attack. Current planning centers around long-range fast, heavy transport or logistics carrier planes, capable of carrying, launching and retrieving parasite fighters, to accompany bombers over enemy territory. The parasites would provide a screen for both the bombers and carriers.

► **One Air Force view on those German forge presses which were brought to the U. S. after the end of World War II: The U. S. is much better off to have taken them, even if they were never used, than for them to have fallen into hands of the Russian aircraft industry. Russians got other German forge presses, which they have been using.**

► USAF researchers are now talking about heavy "logistics carriers" to provide logistics support for all Air Force operations, thus making everything used by USAF in the field completely air transportable. Planes in the 400,000-lb. gross weight category capable of carrying 100,000 lb. payload, with range of approximately 3,500 mi. and cruising at speeds nearly double those of today's military transports are in planning stage. Presumably the proposal by Convair for a sweptwing version of the XC-99, with eight turboprops or eight turbojet engines, (AVIATION WEEK Nov. 5, 1951) would come close to this performance.

► **Proposal of the Civil Aeronautics Board to use an automatic power failure indicator with selective propeller feathering as the safety equivalent to present automatic feathering systems for transports has been endorsed by the Transport Airworthiness Requirement Committee of Aircraft Industries Association.**

► Worsening of working relations between the Civil Aeronautics Board and the U. S. aircraft industry is seen in the disclosure that several aircraft companies have recommended to AIA that any future annual technical CAB airworthiness meetings be deferred until the Board takes official action to adopt the set of regulatory principles for aircraft agreed to at an industry and CAB technical representatives meeting last August.

► **U. S. Coast Guard now has about four of the new larger Sikorsky S-55 rescue helicopters in service and is slated to get four more soon.**

► Curtiss-Wright Corp.'s CW-40 helicopter has been moved from Danbury, Conn., Airport to the company's propeller division site at Caldwell, N. J., for further development and modification work deemed necessary. This, in effect, marks a complete takeover of the craft from Doman Helicopters, Inc., which designed and built the copter as the LZ-4 and first flew it Nov. 11, 1950, at Danbury Airport. Curtiss-Wright purchased the craft in January, 1951. Until July it was flight-tested by C-W personnel at Danbury, then went into Doman's shop for development changes. It was test-flown again during November, and on Dec. 1, the liaison arrangement with Doman was completed. Any future development work or modification will be Curtiss-Wright's independent effort, Doman has announced.

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More Money Slated for Transport Safety

- **Plans stress equipment, training, maintenance.**
- **But some suggestions may stir controversy.**

By F. Lee Moore

Airlines and civil aeronautics officials will try to shift their 1952 budgets to get more emphasis on immediate improvement of air transport safety. This is because the scheduled airline safety record of 1951 barely equaled 1950, and the nonscheduled lines had a tragic and dramatic run of C-46 accidents at the year-end, causing unusually heavy air crash publicity.

Unofficial estimates place 1951 passenger fatalities at about 1.3 per 100 million miles for the scheduled lines (about the same as the year before) and 7.4 for the nonskeds (almost double the year before, despite a perfect 1951 record thru November).

▶**1952 Safety Program**—Main phases of the attack planned against airline accidents are: airline aircraft equipment buying; CAA ground navigation aids installation; airline pilot training and selection, and airline and CAA maintenance checks.

Here's a tally of projects cited to AVIATION WEEK by pilots, airline executives and civil aeronautics officials as deserving more money than has been previously budgeted by airlines and CAA if they're to get an early improvement in safety.

• **Airline flight equipment:** Torquemeters and/or fuel flow meters; all-out oil temperature gauge; flight analysers; and (for some transports) reverse prop pitch and/or longer runway requirements and/or improved braking devices like Hytrol.

• **Airline navigation aids:** Automatic pilot with auto approach coupler; dual omnirange receivers now on airline order; dual DME; pictorial navigator now in evaluation at CAA testing center (will be ready for airline procurement before CAA has installed necessary DME).

• **CAA navigation installations:** Voice identification of ranges and markers, now in slow-expansion phase; terminal omnirange installation (by both CAA and airlines); improved (null reference glide path) ILS now being installed gradually; radar traffic control in advance break-in stage at Washington National Airport; standardized approach light system awaiting final CAA-Navy evaluation; weather analysis equipment and technique; traffic control data compilation and display equipment and technique.

• **Airline pilot training:** Airlines, CAA and the pilots themselves are re-emphasizing need to follow approved standard procedures (only not play around with personally-developed short cuts. Practice of more than one standard answer to a standard condition leads to confusion when emergency conditions arise, they say. Airlines and CAA are intensifying pilot check programs.

• **Maintenance:** CAA is intensifying maintenance and operations inspection of airlines, especially nonskeds. And CAB is expected soon to lower the allowable gross load of the C-46 for passenger flights.

The above tally lists the less controversial programs as to merit. The main question is money.

Then here are some more controversial equipments recommended to AVIATION WEEK by some pilots, airline officials and civil aeronautics officials:

• Backward seating of passengers, which is admittedly safer and gives a better view, but which airlines oppose on grounds of passenger psychology.

• Stall warning indicators, which are adjustable to warn the pilot long before the plane does, and can also give him an automatic approach glide path attitude indication.

• Flight recorders (a favorite idea of CAB investigators) for spot check on pilot accuracy and discipline, but which airlines and pilots oppose because of complexity, cost and other reasons.

• Radio altimeters, which are poor over forests and above 4,000 feet, but Navy now has a heavy development program and already has arrived at an improved version.

• Finally, airborne radar and improved automatic pilot couplers to radio and altitude are in development but will not be ready for airline procurement for some time.

▶**Cockpit Viewpoint**—Many airline and government aeronautics officials lay most of the blame for accidents on

CAB CHAIRMAN Donald Nyrop (pointing) and William K. Andrews, director of CAB Bureau of Safety Investigation, inspect wreckage of C-46 near Little Valley, N. Y.

pilot error. But the pilots point out that in almost every single crash the "error" resulted from unpredictable incidents. The incidents pile up all at once on a pilot to cause an accident. Better equipment can simplify the pilot's job, the pilots say.

Pilots say they are always going to be human and probably will run into potentially fatal difficulties at least every million miles.

▶ **Some Answers**—Equipment improvement is the broadest avenue toward safer airline flying, they point out.

Pilots' plea is mainly summarized as more airline and CAA money and management attention on improving reliability, simplifying cockpit layout and equipment, developing more pictorial and symbolic instrument and control displays, and designing fail-safe equipment and stand-by equipment in case of failure of the primary equipment.

Some pilots see airborne radar as the No. 1 development program needed.

And they see two big obstacles to what they consider necessary budget increases for safety improvement of airborne and ground equipment: airlines, now that they are making money, are putting it into buying new planes to make more money; local congressional constituents appreciate money spent by CAA on airports, but not on navigation aids.

▶ **Nonscheduled Airline Crashes**—The nonskeds—especially C-46 operators—are now suffering some loss of business directly attributable to the publicity given their year-end accident crashes. Here is why:

The Dec. 16 nonsked C-46 crash at Elizabeth, N. J., killed 56, second worst U. S. airline crash in history; the Dec. 29 nonsked C-46 crash at Little Valley killed 26, with 14 survivors under dramatic circumstances; both were nonsked C-46s; both occurred in a two-week period around the Christmas holiday season; three more noteworthy nonsked crashes, two of them with C-46s, occurred in the November-December period.

They all came while CAB was considering reducing the allowable gross load of the C-46, as CAB Chairman Donald Nyrop explained at a press conference at the Little Valley, N. Y., crash scene. Nyrop made his unprecedented flight to the scene from Washington while bodies were being removed and all 14 survivors were still in the local hospital.

▶ **Trouble Ahead**—The nonsked C-46 operators are expected to run into worse business problems when CAB comes out with its expected gross weight reduction order on C-46 passenger operations. This would cut payload of the plane and/or force more fueling stops en route.

Meanwhile, CAA Safety Director

Fatal Airline Crashes in 1951

Here is the record of fatal U. S. airline crashes last year, listing the location of crash, circumstance, type airline, airline name, type of flight, date, type plane, crew and passengers killed, immediate cause (with source, but excluding contributing causes), and finally airline or government action taken.

• **Philadelphia, IFR clearance,** overshot landing, scheduled trunkline, National Airlines, passenger flight, Jan. 14, DC-4 transport, 1 crew and 6 passengers, misjudged glide in approach (CAB).

CAB suggested that CAA towers should advise pilot of running conditions before the pilot plans his approach.

• **Reardon, Wash., IFR clearance,** plunged to earth, scheduled trunkline, Northwest Airlines, passenger flight, Jan. 16, Martin 2-0-2 transport, 3 crew and 7 passengers, lost control for unknown reason (unofficial).

• **Sioux City, Ia., IFR clearance,** stalled in final approach, scheduled trunkline, Mid-Continent Airlines, passenger flight, Mar. 2, DC-3 transport, 3 crew and 13 passengers, stalled into ground for unknown reason (CAB).

Airline and CAA re-emphasized pilot training in pre-stall consciousness.

• **Santa Barbara, Calif., IFR clearance,** hit mountain, scheduled local line, Southwest Airways, passenger flight, Apr. 6, DC-3 transport, 3 crew and 19 passengers, cutting corners and/or trying to fly visually in instrument weather (CAB).

CAB suggested that airlines not put so much emphasis on on-time performance that pilots take shortcuts en route to make up time.

• **Ft. Wayne, Ind., IFR clearance,** knocked to earth, scheduled trunkline, United Air Lines, passenger flight, Apr. 28, DC-3 transport, 3 crew and 5 passengers, flew into edge of tornadic force, fast moving storm (CAB).

Weather reporting to pilots en route was speeded up and made more complete.

• **Monrovia, Liberia, IFR clearance,** hit hill, scheduled international line, Pan American, passenger flight, June 22, L-049 transport, 9 crew and 31 passengers, descending below en route minimum altitude without positive identification of position (CAB).

Changed overlapping frequencies of Dakar and Monrovia Radio ranges, and changed Pan American approach procedure at Monrovia to require check over cone.

• **Ft. Collins, Colo., IFR clearance,** hit mountain, scheduled trunk line, United Air Lines, passenger flight, June 30, DC-6 transport, 5 crew and 45 passengers, misidentified radio range (CAB).

Changed VAR range identity to different one from parallel LMF range, and UAL changed cockpit radio switches to differentiate VAR from LMF switches.

• **Ontario, Calif., flew into ground,** scheduled mail copter line, Los Angeles Airways, routine flight but with pilot instrument training en route, July 2, S-51 copter, 2 crew, cyclic control froze for undetermined reason (preliminary CAA report).

• **Oakland, Calif., IFR clearance,** hit hill, scheduled trunkline, United Air Lines, passenger flight, Aug. 24, DC-6B transport, 6 crew and 44 passengers, attempted visual approach on instrument landing clearance (unofficial).

United briefed pilots again on necessity never to shortcut instrument procedure.

• **Lynwood, Calif., fell to ground,** scheduled mail copter line, Los Angeles Airways, mail flight, Aug. 27, S-51 copter, 1 crew, fatigue failure of flapping hinge at one rotor hub (ALPA).

Replaced flapping hinges on S-51 copters.

• **San Francisco, plunged into bay,** scheduled trunkline, United Air Lines, training flight, Sept. 12, B-377 transport, 3 crew, lost control for unknown reason, possibly stalled during 3-engine approach (unofficial).

• **Tucumcari, Ariz., IFR clearance,** hit ground in approach, nonsked charter, Transocean Air Lines, passenger charter flight, Nov. 5, 2-0-2 transport, 1 passenger, tried to land below allowable weather minimum (unofficial).

• **Oakland, Calif., collision in air,** nonsked charter line, Overseas National Airways, instrument training flight, Nov. 16, DC-4 transport, 3 crew, improper lookout by check pilots of both DC-4s (unofficial).

• **Denver, Colo., plunged to earth,** scheduled trunkline, United Air Lines, training flight, Dec. 4, DC-3 transport, 3 crew, stall and spin from which no recovery for unknown reason (unofficial).

Required a more definite and conservative instruction procedure for all check flights.

• **Elizabeth, N. J., plunged to earth after takeoff,** nonsked carrier line, Miami Airlines, passenger flight, Dec. 16, C-46 transport, 4 crew and 52 passengers, engine nacelle fire causing wing failure (unofficial).

• **Little Valley, N. Y., hit hill,** nonsked carrier, Continental Charters, passenger flight, Dec. 29, C-46 transport, 3 crew and 21 passengers, cause undetermined.

CAA further increased the intensity of C-46 inspections by CAA inspectors.

• **Fairbanks, Alaska, nonsked charter line,** Transocean Air Lines, Navy cargo and passenger contract flight, Dec. 31, C-46 transport, 2 crew and 2 passengers reported aboard, unknown.

Ernest Hensley has opened a drive to improve nonsked maintenance and operations procedure.

He started the nonsked safety check-up drive with an "urgent" New Year's Eve telegram to all CAA regional administrators. This ordered them to put all available inspectors on an all-out nonsked C-46 operations and maintenance inspection and to report for three full days. This is to be followed by a concerted follow-up drive on all nonsked operations.

At the end of the three days, regional reports received showed that from a total of 263 individual plane inspections, four "violations" of safety regulations were found along with 355 so-called "discrepancies," meaning imperfect conditions of a generally minor nature. These figures are not complete however, as the Texas region reported "numerous" discrepancies without a count and the California region reported "processing violations" without enumerating them.

▶**No Overloading**—There were no permanent grounding actions reported, indicating corrective action apparently was taken promptly in all cases listed.

However, it appears that none of the three fatal C-46 crashes in 1951 is attributable to gross load.

Engine nacelle fire burning through the wing spar was the apparent case of the Elizabeth crash. Flying below minimum altitude in bad weather apparently caused the Little Valley crash, and CAB investigators say the cause of the Fairbanks, Alaska crash appears to have resulted from loss of radio and radar contact during instrument approach among the mountains.

▶**Little Valley Crash**—An on-the-spot AVIATION WEEK analyses of the Little Valley crash indicates the following probable cause, confirmed by unofficial conversations with CAB investigators.

Flight originated in Miami. It stopped at Pittsburgh and carried an extra crew and some passengers from there bound for Buffalo to start a new flight back to Miami. En route, minimum altitude between Pittsburgh and Buffalo was supposed to be 4,000 ft. The pilot filed a flight plan to fly visually, but weather conditions clamped down, with ceiling under 4,000 ft. and icing conditions reported from 4,000 to 13,000 ft.

So he apparently decided to fly low instead of turning back—presumably because he carried not only passengers but the flight crew scheduled to fly a Buffalo-Miami flight. Trying to fly visually when clouds were down to the hilltops had the same fatal results as in the Santa Barbara crash of a Southwest DC-3 and Oakland crash of a United DC-6B, also during 1951.

On the scene, it at first appeared that one engine might have been dead, because its prop blades were bent backward, while the other engine's props were bent forward on impact (a prop developing power bends forward as the tips make contact with the ground).

▶**No Mechanical Failure**—Inspection of the prop gears and engine indicated both engines were developing power and that one engine was probably killed by contact with the trees several hundred feet before contact with the ground.

So investigators now believe this was another weather and navigation crash, not a mechanical failure.

AF Takes Wraps Off Boeing XB-52

Above is the first official photograph released by the Defense Dept. of the big eight-jet Boeing Stratofortress heavy bomber. Release was coincident with taking off the plane's camouflage to permit engine tests.

In keeping with Air Force Secretary Thomas K. Finletter's request that no information beyond that released by the Department of Defense be printed concerning the new plane, AVIATION WEEK herewith prints in full the official text accompanying the first XB-52 photo:

"This photograph of the Boeing XB-52, the Air Force's eight-jet heavy bomber, was made public by the Air Force today as engine run-ups of the aircraft at Boeing Field, Seattle, Wash., required moving the aircraft to a more exposed area as well as removal of camouflage. The XB-52 has been under camouflage since it was rolled out from the Boeing factory on Nov. 29.

"In releasing the photograph, Air Force Secretary Thomas K. Finletter issued the following statement: 'The Air Force is releasing a photograph of the Boeing XB-52 which shows the least possible amount of information that could be of value to any enemy. We are making the photograph available mass much as the engine run-up tests require that the aircraft be more exposed.

"'To protect the security of other information concerning the bomber, it is requested that news photographers and the public cooperate with the Air Force by refraining from taking any other photographs. We will make every effort to continue to protect the physical security of this aircraft. The cooperation of the news media since the aircraft's roll-out has been splendid in this connection. We feel sure we will continue to receive such understanding and cooperation in the interest of making the gathering by a potential enemy of information about our classified projects as difficult as possible.'

"(The Boeing XB-52 has been previously announced as a long-range jet bomber equipped with eight J-57 turbojet engines made by Pratt & Whitney. No further details on the aircraft are being disclosed.)"

Since the above release, these additional XB-52 facts have been disclosed by the USAF: The big bomber weighs over 300,000 lb., with experimental cost approximately $250 per pound. Electrical requirements for the XB-52 are about 200 kw., or enough for 300 average American homes.

Boeing Shuffle

● W. E. Beall becomes top operating executive.

● Closer direction between Seattle, Wichita operations.

A regrouping of top management last week set up Wellwood E. Beall as senior vice president and principal operating executive of the Boeing Airplane Co., responsible to President William M. Allen and the Boeing Board of Directors.

The move came shortly after the company had announced that its backlog in military orders now totals $1.25 billion, one of the largest in the industry.

Beall will have general supervision of engineering, manufacturing, contract administration, sales and other functions at Seattle and Wichita. He has long been a key man in the Boeing organization as vice president, engineering sales.

▶ **Big Reshuffle**—Boeing President Allen said that the new Beall assignment and other reshuffling of Boeing executives announced simultaneously were designed to bring about "greatest practicable uniformity of policies and procedures" between Seattle and Wichita divisions. He announced that all functional divisional heads at Seattle, as a part of this new program, would assume policy direction of similar functions at Wichita, if they had not already done so.

The new general consolidation of responsibility at Seattle was preceded last year by consolidation of the Seattle and Wichita engineering departments under E. C. Wells, vice president, engineering.

Other functional heads at Seattle who are assuming policy direction at Wichita as well, include F. P. Laudan, vice president, manufacturing; J. O. Yeasting, vice president, controller; A. F. Logan, vice president, industrial relations; H. E. Bowman, secretary-treasurer; George Sauborn, director of spares; E. P. Kaiser, quality control manager, and Harold Mansfield, director of public relations and advertising.

Frederick B. Collins, vice president, sales, and Jay Morrison, in charge of industrial products division, do not have corresponding departments in Wichita.

▶ **Reports to Beall**—J. Earl Schaefer, vice president, general manager of the Wichita division, will report to Beall hereafter, as will the offices of Boeing Washington and Dayton representatives.

Wellwood E. Beall

Other changes in the Boeing organization: C. B. Gracey is named vice president, manufacturing, Wichita, instead of his former post of vice president, operations, Seattle.

A. W. Schupp, Wichita factory manager, continues in that post, reporting to Gracey.

Clif Barron has been named vice president, divisional controller, Wichita, and assistant secretary and assistant treasurer for the company. He formerly was vice president, assistant general manager Wichita. He will be responsible for finance and contract administration at Wichita.

Clyde Skeen, former assistant secretary-treasurer, Wichita, is transferred to assistant to vice president controller, Seattle.

▶ **B-47 Modifier**—Jack Clark, former assistant to factory manager, Wichita, is named modification center manager in charge of B-47 modification subcontracted to Grand Central Aircraft Corp., Tucson, Ariz.

N. D. Showalter is promoted from assistant chief engineer to chief engineer, Wichita.

President Allen reported that some 42% of Boeing's production is assigned to subcontractors.

Net earnings at the end of the third quarter were reported as $4,055,198, as compared to $8,210,252 for the first three quarters of 1950. Reduction was attributed to lower profit on government business, higher income and excess profits taxes, and to changing the largest airplane contract to a type which does not show income until the airplanes are delivered.

Employment at Seattle has risen to 28,000 and at Wichita to 25,000, as compared to pre-Korea figures of 18,000 and less than 10,000, respectively. World War II peak Boeing employment was 75,000.

▶ **Expansion Plans**—Major Boeing expansion programs at Seattle include: a new engineering and office building, flight test hangar and tooling construction building, all paid for by the company; and government-financed construction of a material-forming and warehouse building and a hammer shop, and many new machine tools.

Seven major construction projects at Wichita include a new flight test hangar big enough to house 12 B-47 bombers, a new electronics building, increased aprons and taxiways, and four warehouses.

Boeing programs include quantity production of B-47 six-jet medium bombers, KC-97F Stratofreighter transport tankers; TB-50 Superfortress bomber trainers; guided missile development programs; limited production of a small gas turbine for the Navy; production and sales of electronic analog computers; an anti-fouling sparkplug, and powerline suspension clamps.

New Copter Blade De-Icers Announced

New electric de-icing for helicopter rotor blades, using a system similar to the de-icer boots sometimes used on aircraft propellers, has been developed and tested by Bell Aircraft Corp. under Navy contract.

Bartram Kelley, Bell chief helicopter engineer, said the system ran more than 50 de-icing tests in 30 days at the summit of Mt. Washington, N. H., with uniform success. The system uses Neoprene rubber strips with electric heating wires imbedded in the strips. These are attached along the entire length of the main rotor blades and cover about one-third of the blade.

Tests were in temperatures ranging from 29F to −14F, in winds up to 80 mph. and in freezing rains and snowstorms. The electrothermal equipment was supplied by B. F. Goodrich Co., Akron. It was installed on the 35 ft. 6 in. diameter rotor of a Bell Navy HTL. Copter was flown in the tests at Mt. Washington by Richard E. Buyers, Bell test pilot. He reported the de-icers caused no adverse effects on normal operating characteristics.

Earlier Sikorsky helicopter blade de-icing experiments in 1950 involved hot air anti-icing through ducts piping warm exhaust air from engine to rotors.

▶ **Overcome Handicap**—Conquering of the icing problem for helicopter rotors will overcome one of the most serious handicaps to all-weather copter.

A Navy spokesman said the Mt. Washington tests developed sufficient data to make possible the use of similar equipment on rotors of virtually any size and type now contemplated.

Navy's New Turboprop XA2J-1 Tested

Navy's new turboprop long-range attack bomber, designed to carry A-bombs from the new super carrier USS Forrestal, has made its first successful flight—a ferry trip from Los Angeles International Airport to Edwards AFB.

Like its smaller predecessor, composite-powered AJ-1 Savage now in fleet service, the new North American plane, designated XA2J-1 Savage, will carry a 10,000-lb. bomb load, but presumably it will have a range well exceeding that of the earlier plane. It may well be the plane to which Navy officials have been referring when they have talked about bombers operating from the Forrestal with 1,700-mile range.

▶**Speed About Same**—The Navy's formidable new weapon, while yet untried, gives added force to the growing argument for a more powerful Naval bombing air arm, which could operate from carriers as a complement to land-based strategic bombers of the USAF and tomorrow's faster jet-powered medium and intercontinental bombers not yet in service.

North American Aviation, Inc. described the new bomber as having a wingspan of over 70 ft. and a "compatible length." This compares with a 65-ft. span on the AJ-1 and a considerably shorter fuselage. Speed apparently is in the same class as that of the earlier plane, both having speeds in excess of 400 mph.

Two Allison T-40 turboprop engines, each one turning a six-blade contra-rotating Aeroproducts propeller, power the XA2J-1. This gives the new airplane the respectable total of 11,000 hp. since early T-40 versions have been rated at 5,525 hp. each at 14,000 rpm. But unofficial reports are that later versions of the twin-turbine Allison engine can get up into the 7,500-hp. class, which would make the XA2J-1 a 15,000-hp. airplane.

▶**Sleeker Looking**—In either case, the new craft has a considerable power step-up from the AJ-1. This has two Pratt & Whitney R-2800-34W engines, rated at 2,500 hp. each in its wing nacelles, plus an Allison J-33 turbojet of more than 4,000 lb. thrust in the tail.

First photo shows the stretched out XA2J-1 to be a much sleeker looking aircraft than the earlier AJ-1, mainly because of a sweptback vertical tail and a slimmer rear fuselage, minus the jet engine installation. And the cockpit enclosure has been cleaned up some, aerodynamically speaking, also. The 45-in. maximum width of the powerful turboprops makes for slimmer nacelles than the 52.8-in. diameter of the piston engines in the AJ-1.

The new bomber is described as being somewhat heavier than its predecessor and is the heaviest of the Navy's carrier-based planes. Official release says its maximum takeoff gross weight is in excess of 26 tons. That the "excess" is considerable is indicated by the fact that the lighter AJ-1's gross weight has been reported at around 55,000 lb. or 3,000 lb. heavier than 26 tons.

▶**Fitted for Carrier**—The XA2J-1 carries a crew of three in a pressurized compartment and an undisclosed number of 20-mm. cannon as armament. Wings fold inboard, with the swept vertical tail folding down for easier carrier storage. Tricycle landing gear includes a dual nose wheel, replacing the single nosewheel of the earlier Savage. Standard Navy arresting equipment for carrier landings is part of the plane's equipment. Large high lift flaps are a feature of the straight wing.

How adaptable the heavier new aircraft will be to existing U.S. carriers, even the three largest now in service (45,000-ton Midway class) is not disclosed. However, these have been used successfully with the AJ-1s and have provided takeoff decks for the Lockheed P2V patrol bombers of about equal takeoff weight. The P2Vs are not equipped for carrier landings.

▶**Move Tests**—North American test pilot Robert Baker piloted the big plane on its initial flight to Edwards after a long series of engine runups and taxi tests had been conducted. At the conclusion of his 30-min. flight, Baker described the flight as "very satisfactory." He said, "The plane has a lot of power and speed, just what it needs for carrier operations."

The plane will remain at the North American flight test center at Edwards for Phase I flight tests. It is the first of two of the new type being built by North American, presumably to be followed by a larger production order soon.

AF Sets Armament Procurement Policy

Long-standing disagreement between Air Force and Army over control of design and development of aircraft armament was resolved last week when Air Force published its regulation setting policy for independent development and procurement of USAF armament equipment.

In AF Regulation 136-1, Air Force stated that because of the complexity of new aircraft and required armament, it had become necessary to consider combat aircraft . . . "as complete weapons systems from conception to the end of service life." This fact, Air Force explained, makes it mandatory that armament equipment be integrated in future aircraft design proposals.

Further, the Air Force said it will "develop and construct such integrated systems of facilities as may be required to insure complete and comprehensive development, testing and evaluation of armament equipment."

▶**Exchange Service**—The new policy

separates Air Force procurement of armament from Army Ordnance, which previously had been the joint procurement agency for both services. However, both Army and Air Force armament experts emphasize that the two services will continue to draw on each other's technical service and that Air Force will continue to avail itself of Army's extensive ordnance test facilities for some time.

So far, USAF is merely authorized to follow separate armament design, development and procurement needs peculiar to its service if necessary.

▶ **New Industry**—As a result of this decision, Air Force stated that it will "emphasize, encourage and support the development of armament activities within the U. S. industry which will insure research, development, and production capacity in times of peace as well as war."

This clause of the new policy directive, an Air Force spokesman said, in effect gives a green light to the establishment of an industry specifically charged with military arms development. The Oerlikon Tool and Arms Corp. of America, newly organized subsidiary of the Swiss armament complex, Oerlikon Tool and Arms, Buehrle and Co., falls squarely under terms of this clause, he said.

Oerlikon America, with headquarters in Washington, headed by retired USAF Lt. Gen. K. B. Wolfe, former Deputy Chief of Staff for Materiel announced a short time ago (AVIATION WEEK Nov. 5 p. 13) development of a family of armament designed solely for aircraft use. The company has been in negotiation with USAF for production contracts for both medium caliber ammunition and aircraft rockets of varying type and purpose.

▶ **Others Interested**—Several other companies, including Olin Industries, East Alton, Ill., who just announced appointment of retired Lt. Gen. E. R. Quesada, former USAF tactical air expert, as vice president to lead its armaments manufacture and sales, are also vitally concerned from an industry point of view. Olin Industries controls Winchester Arms Corp.

Among other companies keeping an eye on the new USAF armament policy are Hughes Aircraft Company, General Motors, General Electric, Westinghouse, Emerson Electric, Bendix, Sperry and others.

Air Force said that, to keep its new program going full blast, it would establish a career field in Air Force armament to attract and retain qualified armament personnel. It has directed the Air University at Maxwell AFB, Ala., to maintain advanced courses of training to provide personnel with a high level of competence in the scientific fields related to armament.

Goals for 1952

● Wilson sees extension of air production peak.

● But a higher level is not anticipated this year.

Air power goals will likely be raised this year but that won't mean a higher level of production for the aircraft industry than the presently confirmed goals of a 95-wing Air Force and a 14-air carrier-group Navy. When the present peak production level is reached—probably by mid-1953—it will simply be extended, instead of tapered off.

Defense Mobilization Director Charles Wilson anticipated that in his recent report to the President for the fourth quarter of 1951, which explained:

"The higher (military) goals would be concentrated upon the same long-lead-time production (such as aircraft) which make up the bulk of the present program. Since we are pressing now at full speed to reach our present production targets on these items, the additional production would not in general add to our immediate schedules but would rather extend our schedules somewhat further into the future."

Wilson called 1951 a year of "tremendous achievements" and 1952 a challenging year, perhaps "the most difficult year" in the U. S. long-haul mobilization program.

▶ **More Money**—Military production is getting into high gear. Outstanding orders of the military total $40 billion—or twice the total of $20 billion in deliveries during the year and a half since the start of the Korean war. In addition, the military has $38 billion that's due for obligation between now and July. Then, the budget for the 1953 fiscal year, which starts July 1, will add another major military production burden on industry.

Of last year's achievements, Wilson reported:

● Air Force added 28 wings to its strength and today has a total of 90.

● Aircraft industry expanded by 67%. Employment of production workers, only 187,000 in June, 1950, when the outbreak in Korea occurred, grew from 239,000 at the start of 1951 to over 400,000.

● Expansion of the programs to sustain military production moved forward: Steel capacity increased 4%; aluminum capacity 10%; and electric power capability 10%.

● Accomplishments were with "relatively little dislocation of the civilian economy." The by-word was "balance"—on guns and butter—and will continue to be.

Wilson explained:

"We must strike a balance between the phases of our program that make for immediate military strength and the things that make for a strong mobilization base over a longer period. Specifically, we do not desire large stocks of weapons that are or will soon be obsolescent at the expense of the newer-model weapons. We must also recognize that a healthy civilian economy is a strategic element in a long-drawn-out cold war."

But, he added: "Policy has been, and will continue to be, to allocate to the armed forces and the atomic energy program their full need for materials after their estimates have been thoroughly reviewed."

▶ **Ahead in 1952**—Wilson's forecast for 1952:

● "For aircraft, 1952 will see the putting in place of the tools, facilities, and materials which will guarantee the peak period to come later."

● Generally, machine tools "will remain the most important factor limiting military production for many months to come," but for aircraft, lags in production and those which may occur over the next few months "can be traced less to tool shortages than to problems of design, testing and modification."

In the aircraft program, the bulk of future tool requirements are for second and third production sources, which for the most part will not come into production for some time. Generally, tools as well as facilities and materials are available or assured for the pilot-line producers.

● To assure a smooth flow of materials and components, aircraft firms and other firms whose work is "largely confined to defense products" will be permitted separate "identification symbols" for obtaining all requirements of components and materials on a preferred basis without the necessity of precise identification.

● To break manpower bottlenecks that may develop over the year, the Wage Stabilization Board may authorize higher wage rates.

▶ **Year-End Review**—The production outlook for 1952 was pin-pointed finer by Defense Production Administrator Manly Fleischmann in a year-end review:

Airplane production is expected to increase over 1951 levels by about 115%, Fleischmann said. (This would put anticipated 1952 output between 9,600 and 10,700 planes, provided Fleischmann was referring to actual production and not a monthly rate of production.) Electronics manufacture is scheduled to rise 268%, he said, and the machine tool industry will be operating at "an $800-million rate" compared to 1951 machine tool shipments of $305 million.

Management Key to Martin Money

Sweeping financial plan involves RFC aid and higher 4-0-4 price; but it all depends on change in top officials.

By Alexander McSurely

Search for new top management for the Glenn L. Martin Co. was going on last week inside and outside the aircraft industry as the necessary prerequisite to putting into effect the new $32 million financing program for the Baltimore aircraft company. It was understood that new management was a condition of the new financing plan.

With capable aircraft management talent already spread very thin by expanding military programs, some industry sources forecast that the new top men might well be picked from an allied industry, such as a transportation equipment manufacturer.

If this is actually accomplished, it could mean that C. C. Pearson, current president, would continue with the company for a breaking-in period, or until the new management was ready to act, by moving in its own team. There was other speculation that Pearson might stay on at Martin as production boss, but with a new management executive handling the financial aspects. Pearson is recognized as a top production getter in the aviation industry.

▶**Financing Plans**—Details of the Martin financing program, disclosed by Navy Secretary Dan Kimball, indicate that as much as $32 million additional in aggregate financing is scheduled. This is subject to Martin stockholders' concurrence.

Kimball's announcement said the new plan had the full endorsement of Air Force Secretary Thomas K. Finletter.

Analysis of the financing program shows that it is divided into two segments, affecting Martin's commercial airliner and military contracts.

▶**4-0-4 Arrangements**—Modification (upward) of prices on the 60 4-0-4 airliners ordered by Eastern Air Lines and the 41 ordered by TWA and on options to additional 4-0-4s is a part of the agreement, Kimball said. The modification involves an increase of approximately $25,000 per plane in the price to be paid by the airlines.

Original price was reported to be approximately $475,000 per plane. The increase would mean an additional total payment of over $2.5 million by the two airlines to Martin. Kimball said that the two airlines had agreed to this. And Kimball said that the two airlines had cooperated in the general financing plan.

▶**2-0-2A Funds**—Release by RFC of its claim to net proceeds from the sale of Martin 2-0-2A transports which have been estimated at $4.5 million is provided in the plan.

RFC had had a claim on the 2-0-2A sale proceeds as additional collateral on its loan of $14.5 million to Martin, secured primarily by a first mortgage on the Martin plant and facilities. These other assets are currently appraised in varying amounts up to $35 million and are being expanded through $30 million additional of facility contracts.

They are considered ample security for the loan, without the additional 2-0-2A collateral. The 2-0-2As are still under lease to TWA, pending replacement by 4-0-4s, and are to be turned back to Martin as replaced, for sale to other purchasers. The $4.5 million estimate for their proceeds is a tentative figure only and final sale price could be more or less.

▶**V-Loans Increased**—Biggest single contribution to the ailing Martin finances in the plan is an increase in V-loans to finance defense contracts, from the current $16.5 million to $27.5 million, a stepup of $11 million. This is considered ample, Kimball said, to finance the present defense contract backlog reported "in excess of $400 million."

Banks which have handled Martin's earlier V-loans are Mellon National Bank and Trust Co., Pittsburgh; Chase National Bank, New York, and the Baltimore National Bank. It is probable these banks will handle the new loans as well.

▶**Defense Credit**—Establishment of a $7.5 million credit reserve for Martin is programmed under Section 302 of the Defense Production Act of 1950, with RFC providing the credit. The section authorizes such credit to companies participating in defense programs when it is not available otherwise.

▶**Private Financing**—New private capital provided by an arrangement through Smith Barney & Co., of New York is expected to provide the balance of the $32 million new financing, which figures out to approximately $6.5 million. Earlier it had been reported that the Smith Barney share of the financing would be $5 million.

Unofficial reports are that the financing group will include Laurence S. Rockefeller, who already has substantial aviation interests in Eastern Air Lines, McDonnell Aircraft Corp., Piasecki Helicopter Corp. and Reaction Motors Inc. There was some speculation that at least part of the new Martin management might be drawn from some of these other aviation companies.

Glenn L. Martin, founder and chairman of the board of the Martin company, and Smith Barney are expected to be principal figures, along with the military services, in picking the new management personnel. But it is understood that the new management will have to be acceptable to RFC and Office of Defense Mobilization as well as to the military services.

There were reports that Mr. Martin, who owns 26% of the currently outstanding stock of the company, would take less active voice in the management under the new setup than formerly. It is assumed that the new private financing will be handled through issue of additional company stock.

▶**Lose $18-Million**—Martin financial difficulties are attributable largely to losses suffered in its commercial transport production program going back to its first postwar transport, the Martin 2-0-2, as well as its current production program on the successor 4-0-4.

It was previously reported (AVIATION WEEK Dec. 10, p. 14) that Martin losses amounted to $18 million for the first nine months. A spokesman for the company attributes this largely to increased costs of manpower and materials and mounting production costs following the Korean crisis, which were not taken into account when the original price of the airplanes was set.

Martin's current military backlog includes orders for the USAF B-57A Canberra light bomber, guided missiles including the Matador, Viking and others, Navy flying boat and patrol bomber contracts, large subcontracts for production of assemblies of Grumman jet fighters, and considerable electronics business.

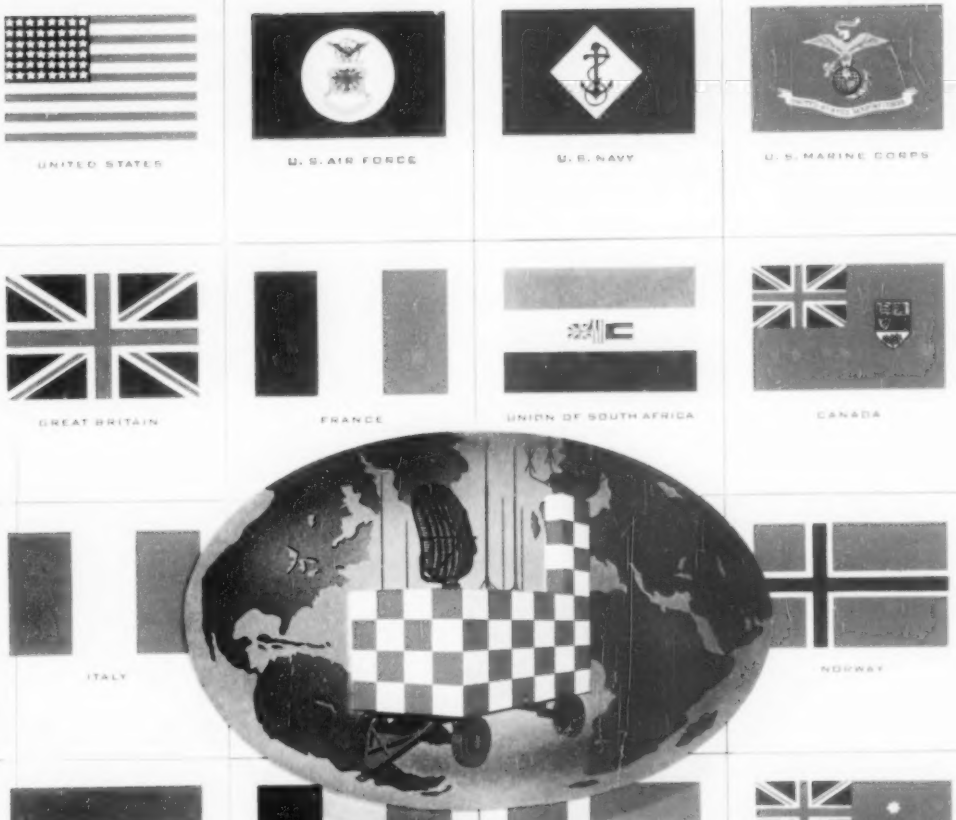
1953 Budget

President Truman will request a $52-billion defense budget for the 1953 fiscal year, starting July 1, which allocates $21.7 billion to the Air Force and contemplates achievement of a 143-wing USAF strength by mid-1954, according to a reliable source.

Army is allocated $14.7 billion and the Navy $13.6 billion, it was said. The remainder making up the $52 billion is for the Office of the Secretary of Defense and service-wide activities.

Under present plans, the President will submit the budget to Congress Jan. 21.

Get in the Scrap—Turn Yours in for Defense



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Fiat Discloses Details of Turbojet G 80

- **First Italian turbojet aircraft starts flight tests with de Havilland Goblin 35 centrifugal engine.**
- **Succeeding prototypes of the trainer-fighter will carry Rolls-Royce Nene and DH Ghost powerplants.**

Flight tests have begun for Italy's first turbojet aircraft, the Fiat G 80 trainer-fighter. Almost 18 months after first announcement (AVIATION WEEK July 31, 1950, p.28), the plane flew at Turin in southern Italy early in December. Vittore Catella, Fiat pilot, was at the controls for the first flight.

This first version of the G 80 is powered by a British de Havilland Goblin 35 centrifugal turbojet; it will be followed by a second prototype with a Rolls-Royce Nene. And there will be a third using the de Havilland Ghost engine.

The design of the G 80, which marks a renaissance in Italy's highly competent aircraft industry, is the work of Prof. Gabrielli of Fiat. And the development of the airframe must have been quite a task for the Italians, limited as they were by lack of research facilities.

▶**Similarity**—Perhaps the best U. S. plane to use as a comparison for the G 80 is Lockheed's F-80 Shooting Star.

The airplanes are similar in performance, dimensions and weights, but not in appearance.

Dimensionally, the G 80 stacks up this way: Span, 36 ft.; length, 40 ft. 6 in.; wing area, 270 sq. ft. Its empty weight is 8,950 lb., and gross is 11,910 lb.

Maximum speed of the trainer is 550 mph. at sea level. With flaps, it stalls at 105 mph. on the deck. Ceiling is 44,000 ft. and the takeoff run is 2,100 ft.

As part of the Fiat plan for getting maximum performance out of the craft, wing profile and roughness tolerances of 1 mm. and 0.2 mm. respectively were set. The actual wing on inspection showed contour variations under 0.3 mm., and roughness under 0.1 mm.

The wing is skinned with thick sheet, butt-jointed. Skins are fastened with an internal butt strap fastened with countersunk rivets.

▶**Stiffness**—Aeroelastic phenomena are accounted for on the G 80 design by making wing and tail surfaces very stiff in torsion. Rigid transmissions replace flexible cable wherever possible in the plane.

Ailerons and rudder are so thin that normal internal installation of balance weights was not possible. Consequently, weights were located near those surfaces and connected to the surface through a system of levers.

High-strength alloys of an unspecified type were used in the construction of the G 80. New shop and inspection techniques had to be used at Fiat to handle these materials. Checking of the finished parts included an inspection with fluorescence in black light, similar to the Zyglo process.

▶**Structure**—The monocoque fuselage of the craft is divided into three sections. The nose piece includes the cockpit, the nose wheel and gear and the engine air intakes. The mid-section is the structural heart and ties in to the wing center section, in addition to carrying the main fuel tanks and housing the engine. The tail section contains engine tailpipe and of course, holds on the tail surfaces.

The nose section is held on with a Fiat-developed worm fastener which permits quick removal. It can be replaced with other noses equipped for different uses.

The forward position is for the instructor-pilot, and the rear one for the student. Both positions are fully instrumented for day and night flying. Canopies are jettisonable, and seats are Martin-Baker ejection types. The cockpit is pressurized and sealed with an inflatable tubular joint.

The wing panels—one center and two outer—are of conventional box construction. Metal-covered ailerons and split flaps are fitted. Tip panels can be replaced with sections of increased span to boost wing area and aspect ratio.

▶**Equipment**—Six metal tanks carry the fuel supply; two are in the fuselage and two on each side in the outer panels. Nylon-rubber tanks also have been designed for increased fuel capac-

ity. And wingtip tanks can be fitted.

Electrical equipment is all d.c. supplied by dynamo and two series-connected batteries. Two external plug connections are provided, one for testing internal circuits and the other for starting the jet engine.

Radio is a VHF transmitter-receiver with 10 channels.

Fire extinguisher is a Graviner-type, using methyl bromide. It is operated from either cockpit or by an inertia switch.

During the flight test period, the rear cockpit contains a photopanel installation. In addition, a recording device registers pilot's comments.

BEA Outlines Specs For Passenger Copter

A 45-passenger helicopter is the future answer to the short-haul problems of British European Airways Corp. That is the implication of the requirements outlined by BEA in a type specification now ready for circulation throughout the British aircraft industry.

The spec outlines the design of a multi-engine copter which should be capable of economic operation over stage lengths of 50 to 250 miles, between city centers.

BEA's conclusions were reached after four years of experience with its experimental helicopter unit, and as a result of engineering, economic and traffic studies. Internal routes within the British Isles and some cross-Channel service routes were considered in the studies.

Such a large helicopter would probably be developed first as a 30-passenger job to fly a distance of 115 mi. with full fuel and one-hour reserve. But the airframe should be designed with volumetric capacity to take 45 passengers and fuel for a 230-mi. flight at some later time.

With a copter of this size, BEA says its preliminary estimates indicate competitive costs (presumably with fixed-wing planes) on a seat-mile basis.

In addition to the number of passengers, stage lengths and multi-engine requirements, BEA also says it would like to have:

- **Cruising at 150 mph. or better.**
- **One-engine-out performance.**
- **Easy handling** even in the worst weather.
- **De-icing and anti-icing** comparable to contemporary fixed-wing craft.
- **Landing field of 400-ft. diameter** with surrounding obstruction slope of one in two.

After design studies have been made, BEA hopes to order a number of prototype craft of different designs for evaluation.

Nylon Bearings Show Long Life

Experimental proving of nylon bearing blocks for engine applications has shown promising characteristics. Edilo of Delft, Holland, has been fabricating these units from nylon bars on a lathe to the nearest hundredth of a millimeter, and has reported very low production costs.

The nylon bearings are said to last 4 to 5 times longer than bronze bearings and sustain a pressure of one ton per square centimeter, with almost no lubrication required.

The product is being sold under the trade name of Edilon.

Laminating Resin Takes High Heat

A new high-strength at high-heat polyester laminating resin is under test at Wright Air Development Center for use in manufacture of fast planes and guided missiles.

Developer of the material, reported to withstand temperatures as high as 500F, is United States Rubber Co.'s Naugatuck Chemical division.

Laminates made with the resin and glass fabric are said by the company to retain good flexural strength—40-47,000

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Here's the turbine assembly of Pratt & Whitney Aircraft's great J-42 Turbo-Wasp—first jet engine to attain official rating for 1,000 hour overhaul.

Take a particular look at the turbine blades, photographed after 500 hours of actual operation. Besides contributing to the general service dependability of the J-42, they have another remarkable story all their own.

Combat pilots in Korea report that these blades, operating at 12,000 rpm and at extremely high temperatures, have taken damage from bullets and rocks without serious impairment of engine performance – and brought plane and pilot safely back to base.

The forging of rugged blades like these is the type of work we're doing here at UTICA. We're proud that UTICA was one of the earliest primary suppliers of turbine blades to Pratt & Whitney Aircraft for the Turbo-Wasp.

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J. PAUL NEAL, DES MOINES, IOWA. With his son, Paul Neal, Jr., and one secretary, Mr. Neal operates a business and investment realty company which handles commercial and industrial real estate, large farms and the like.

He and his son both fly . . . use their Cessna 170 constantly for personal contact with distant prospects, appraising and showing property from the air, taking color aerial photos of choice farms and for hunting and fishing trips. In the first year, Neal feels he paid for the 170 three or four times over—in deals he would not have tackled without the plane.

F. J. MEYER, MADISON, WIS. At 41, Mr. Meyer heads Red Dot Foods, Inc. . . . a $4,000,000-a-year potato chip and "party" foods business which he started with one potato chip machine while still in college.

Mr. Meyer purchased his first Cessna in 1946 with the express purpose of speeding up business operations — now owns a Cessna 170. He flies between sales branches and plants in six states and potato farms in Wisconsin, Alabama and Florida — attends many conventions and packaging shows —commutes by plane in the summer from a farm home in Northern Wisconsin. Last winter he flew to Mexico. Mr. Meyer says that without his 170 all of these things could not have been accomplished.

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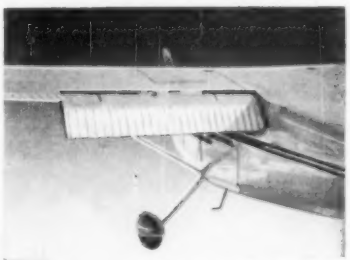

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psi.—when exposed for as long as 200 hr. at 500F, and over 30,000 psi. when exposed for as long as 24 hr. at 500F. Heat resistance is attributed to incorporation of triallyl cyanurate.

Marketed as Vibrin X-1047, the resin initially will be available for military applications, the company reports, but production capacity is being extended to take care of electrical, electronic, radio and allied applications.

Busy Year Forecast At Wright Air Center

Dayton—The year 1952 promises even more activity than busy 1951 brought the 10,000-odd employes in the Wright Air Development Center here.

Engineers, scientists, pilots and specialized laboratory technicians have on tap about 1,300 individual projects, reflecting advances in virtually every phase of developing a complete Air Force.

A rough grouping of categories would include airframe, engine, propeller, guided missiles and electronics in addition to supporting programs. Highlights of each include:

• **Airframe.** Ticketed for flight tests is the Convair B-60, a revamped version of the B-36. Further information on aerodynamics is anticipated from extensive tests of the X-5 and the XF-92 featuring, respectively, the variable sweptback wing and the delta wing configuration.

• **Engine.** NEPA ("Nuclear Energy for the Propulsion of Aircraft") is the big word in this field. It could revolutionize current thinking on plane power plants. Air Force has signed a development contract with Consolidated Vultee for study and design of an aircraft to be powered by NEPA. Jet helicopters are scheduled for testing as a result of copter performances in Korean fighting.

• **Propeller.** Extensive studies are on the horizon for propellers capable of supersonic speeds. This amounts to a resurrection for propellers, which were consigned to the "obsolete" scrap pile at the outset of jet propulsion. New rotor test rigs point up considerable more work on the helicopter phase of this activity.

• **Guided Missile.** After one brief publicity splurge on the Martin Matador, Air Force put the program under wraps. Data obtained by WADC from proving ground tests may result in closer approximation to "push button" offense.

• **Electronics.** This is the most active of all of the major fields. Virtually every electronic device is being improved and new ones are being added. The goal in this activity is flight in all

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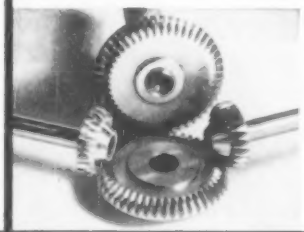

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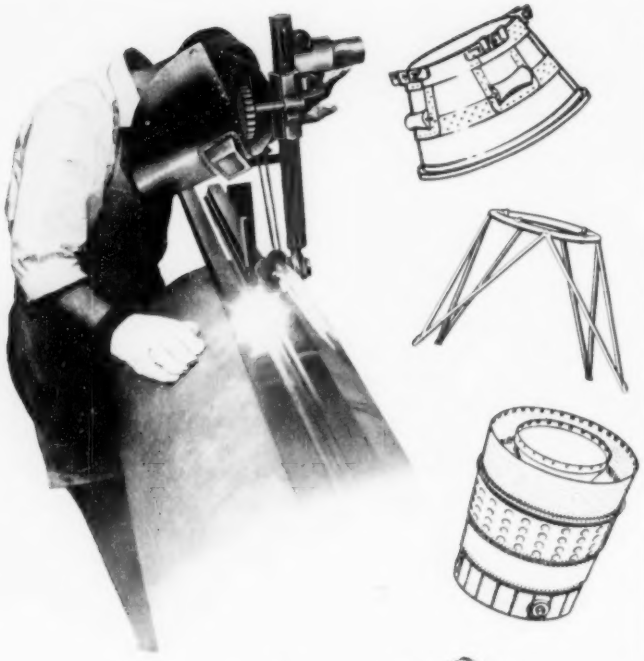

Welded by Lavelle...

New alloys can present complex welding problems. These are the problems aircraft engineers usually turn over to us. "That's a job for Lavelle", they say. And they're right! Lavelle's technicians have the experience and the equipment to do the job. "Shop Control", the precise care they exercise in every phase of their work, has brought us an industry-wide reputation as a truly unique and reliable subcontractor.

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possible weather conditions, as well as overall improvement of operational instruments and systems.

In-flight refueling will be given much attention, following repeated tests which revealed the value of this contribution to long-range operations. Data already compiled in connection with the B-47 (being refueled from KC-97s) indicates technique can be adapted to any type of aircraft.

Considerable stress also will be placed on cargo parachute dropping techniques. Aim is perfection of equipment to a point where complete armies can be supplied by air with chutes capable of dropping 10-ton equipment without splashing it all over the landscape.

Organizationally, there is an indication WADC activities may be linked a bit closer to the parent organization, Air Research and Development Command, by moving the latter to Wright-Patterson AFB from Baltimore. The present arrangement has been a source of expensive concern to Air Force contractors who need to do business with WADC project engineers at Dayton and ARDC buyers in Baltimore.

Seven segments presently comprise WADC operations. All laboratories, they are Weapons Systems, Weapons Components, Aeronautics, Research, Flight Test, Materiel and Engineering Standards.

Circle Cutter Fits on Bandsaw

A cutting attachment for bandsaws is slicing shop costs at Texas Engineering and Manufacturing Co. Inc.

Use of the device has effected an average reduction of about 90% in manhours needed to produce disks and other wood items having one or more curved dimensions. As many as 200

Flight view of the Lockheed 1049 Super Constellation, the newest member of the famous family of Constellations that are in service on 16 major world airlines. All glass in the cockpit is Pittsburgh Flexseal Safety Glass.

Lockheed's new Super Constellation features improved cockpit vision with Pittsburgh Flexseal Safety Glass

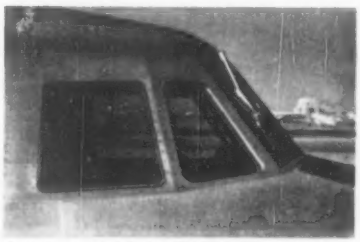
NEWEST addition to Lockheed's famous family of Constellations is this giant 1049 Super Constellation. Pilot vision came in for careful attention in designing this plane, and every possible step was taken to assure the best visibility in all directions under every flying condition.

The seven openings in the cockpit are all glazed with flat Pittsburgh Flexseal Safety Glass. This glass and plastic lamination has been found ideal for the high-speed, high-altitude operation typical of the Constellations. It is flush-mounted with narrow posts that provide the least possible obstruction to vision and it is bird-resisting.

The three forward glass areas in the cockpit make use of electrically-heated Pittsburgh NESA Glass. This special type of Flexseal was installed after exhaustive tests of its heating and pressurizing cycles in Lockheed laboratories.

Thus the 88-passenger Super Constellation takes its place alongside many other commercial and military planes equipped with Safety Glass by Pittsburgh. Manufacturers consistently bring their glazing problems to Pittsburgh, knowing they'll receive competent engineering assistance along with Safety Glass specifically designed for the job it must perform.

We invite you to submit your Safety Glass and glazing problems to Pittsburgh engineers; they'll receive the most careful attention. Pittsburgh Plate Glass Company, Room 2035-2, Grant Building, Pittsburgh 19, Pa.



A close-up view of the side windows of the Super Constellation's cockpit. Note the unobstructed vision insured by an advanced joining method that permits the use of extremely narrow posts.

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G-E service follows G-E equipment around the glo Here, "tech reps" from General Electric and No American Aviation Inc. in Korea discuss combat perfo ance of the G-E-powered, North American-built F Sabre. G-E aviation field service representatives co the vital spots in the world, are always available.

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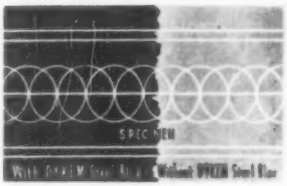

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4	2"	11S4	36SR4
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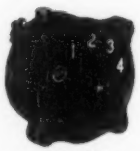
6	3"	10S6	37SR6
8	3"	10S8	37SR8
9	3"	10S9	37SR9
10	3"	10S10	37SR10
12	3"	10S12	37SR12
16	3"	10S16	37SR16
18	3"	10S18	37SR18
20	3"	10S20	37SR20
24	4"	27S24B2	38SR24
28	4"	27S28B4	38SR28
40	4"	38S2C	

*Resistance thermometer switches are provided with a safety resistor on off position.



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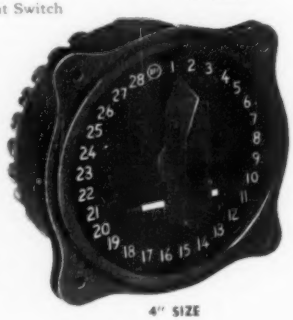

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different items of these types are required each month for use as cover plates, shipping-crate cradles, etc.

Temco says that only two or three minutes are required to set up the device—an auxiliary table 24 in. square by 1½ in. thick, placed on top of the bandsaw table and fastened by two thumb screws.

A movable radius gage pin serves as a pivot for revolving the wood on which the circle is to be cut. Two scales at right angles to each other serve to center the radius pin against which the wood is pressed.

Camera Will Record Dive-Bombing Runs

Precision data from dive-bombing runs can be gathered by what is probably the largest 35-mm. camera yet built—the 1,500-lb. Beckman & Whitley Target-Angle Recorder.

The unit was ordered by U.S. Naval Ordnance for studies of aircraft flight path and dive-angle variations. It takes 10 photos per second for a period of two minutes.

Gunsight tube on top of the assembly is used for aiming the entire unit.

The operator of the camera uses a control stick like that of an airplane to keep the craft centered in the crosshairs of the sight.

Later tests call for live bombing runs to be made on the recorder. Remote sighting of the recorder will be done by television with the camera mounted behind the gunsight. The control unit will be placed at the receiving station for the television signal from the camera sight.

Pictures are photographed through a large graticule which is marked with rulings and index numbers. The internal temperature of the camera is maintained at 90F by heaters and thermostatic controls for dimensional stability of the graticule.

Camera is made by Beckman & Whitley, Inc., 906 San Carlos Ave., San Carlos, Calif.

'Water Table' to Check Sonic Data

A "water table" for studying shock wave patterns beyond the sonic barrier, such as those set up by supersonic jets and guided missiles, has been constructed for the engineering department at the University of Tennessee.

Considered a supplement to wind-tunnels, the model will be used for teaching future engineers the principles of supersonic flow. It is capable of producing data on effects of speeds as high as 2,500 mph.

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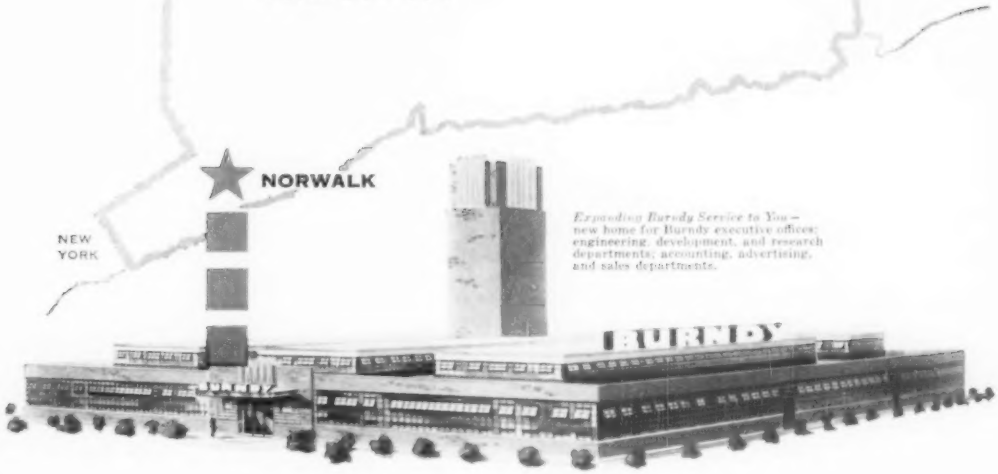

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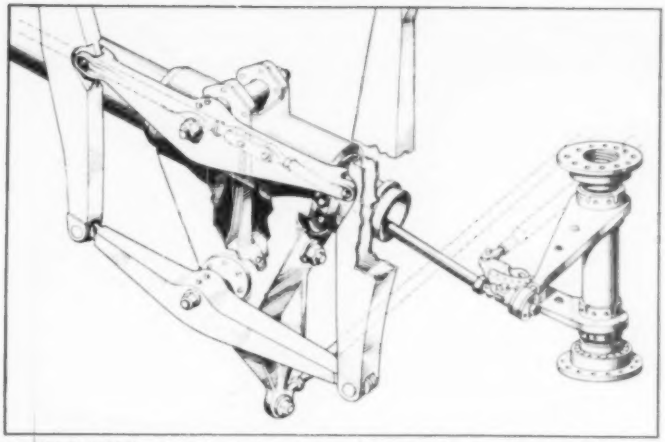

DOUBLE STICK controls (vertical posts upper left and center) have been tested in large SE 2010 Armagnac transport as a means of reducing pilot fatigue.

French Fly Jets From 'Armchair'

Unusual control system in the Grognard is claimed to reduce pilot fatigue and eliminate cockpit clutter.

(McGraw-Hill World News)

Paris—A young French aviation engineer has taken armchair-flying out of the parlor and installed it in the front office of a high-powered jet fighter. He did it with an unusual system of controls that replaces the conventional stick or wheel.

The invention of Jacques Lecarme, engineer and test pilot at SNCASE (Societe Nationale de Constructions Aeronautiques du Sud-Est), the system is flying in the SE 2410 Grognard, a twin-jet fighter prototype.

► **System Design**—Lecarme's armchair is mechanically simple. At the end of each arm there is a handle which the pilot grasps. Connecting rods pivoted under his elbow and behind his shoulder translate the movements of his arms into flight directions.

The pilot's arm motions are almost the same as with conventional controls. To gain altitude he pulls back horizontally on the handles. To reduce altitude he pushes forward. To bank he pushes down vertically on the arm in the direction of the bank and raises the arm on the other side.

The mechanisms of the two arms are interconnected so that a vertical push on one arm also raises the other to produce a bank; a horizontal thrust on one arm is duplicated in the other arm for a change in attitude.

The armchair is adjustable to fit the pilot. And Lecarme has drafted an adaptation of this system for planes in which the pilot is in a prone position.

ARMCHAIR FLYING by manipulating chair handles is another fatigue-easing system.

► **Advantages**—Lecarme and SNCASE claim three major advantages for the armchair control system:

- **Clear view** of the instrument panel, as a result of elimination of the centerline stick or wheel installation.
- **Fatigue reduction,** resulting from the upholstered armrest and seat.
- **Clear cockpit,** again from the elimination of the centerline control column. This should make escape from the craft easier.

► **Double Stick**—Lecarme began working to improve aircraft controls before the end of the war and applied for his first patent on a new type control Sept. 13, 1945. In addition to the armchair controls in the SE 2410 Grognard, he has built a "double stick" control system which has been tested with satisfactory results in the big SE 2010 four-engine Armagnac transport.

His double stick controls consists of a pair of sticks each curved slightly toward the center and placed one on each side of the pilot's seat. The system functions in much the same way as a conventional system. The mechanism is pivoted at its base so that changes in attitude are produced by moving the stick forward or to the rear and banks by a circular motion like the turning of a wheel.

This system also gives the pilot a clear view of his instrument panel at all times, but it has fewer advantages over conventional controls than the armchair in reducing pilot fatigue and in clearing the cockpit of the encumbrance of the stick.

► **Limitations**—SNCASE flight tests conducted by Lecarme and others, while proving that both the armchair and the double stick controls have distinct advantages over conventional systems, have indicated there still may be room for improvement. Tests showed the armchair controls, tried out in the Grognard fighter, may be better suited for transport planes or bombers than for fighters. In the acrobatics required of fighters, pilots tend to react more naturally and quickly with a wheel than with the armchair controls.

Lecarme believes the best possible controls for modern planes should be designed to leave the cockpit clear of the encumbrance of a conventional stick, should be easily operated by one hand, and should move in a pattern closely similar to that of conventional controls. He is working toward that goal, convinced that the type of controls now in general use are in for some important modifications in the near future.

GE Sees Jump in '52 Electronic Work

General Electric's 1952 production of military electronic and avionic equipment is expected to total more than double the 1951 figure, and will account for more than half the Electronic division's business.

Dr. W. R. G. Baker, vice president and general manager of the division said in his year-end statement that new plants will add in 1952 to the military production facilities which were converted from commercial television and radio manufacturing space.

And Dr. Baker has a word of praise for GE's large number of suppliers and subcontractors whose cooperation made the expansion possible.

About 35 or 40% of the company's electron tube production is slated for the military in 1952. Work will be continued on high-reliability tubes for radar applications. And Dr. Baker predicts an all-time sales and production record for electronics in 1952.

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PLENTY of Boeing B-47 jet bombers are being produced at its Wichita plant, but . . .

TOO FEW deliveries have been made to Air Force to permit combat training of crews.

Stratojet Delays Worry Air Force

Delay in delivery of Boeing B-47 medium jet bombers is beginning to worry the Air Force, which has been forced to restrict its training activities to transition.

There has been no combat training because AF has received an insufficient quantity of B-47s.

Plenty of the sweptwing bombers are being produced, but avionics problems involved and the shortage of technicians have delayed delivery of completed units to the Air Force.

▶ **Biggest Problem**—The B-47 is designed to do the job in today's modern warfare that the B-29 did in World War II, but with a crew of three instead of 13 and at one-third the time.

Avionics have had to be developed to replace ten crewmen. That has been the biggest problem. Boeing engineers report that 25 miles of wiring have been necessary to do the job.

▶ **Other Problems**—And there have been a good many other problems. For instance: getting bomb bays open and closed at 550 mph-plus. That problem was overcome, only to lead to another—how to keep the "plumbing" from being torn out when bomb bays were opened.

Delays in engine and component parts delivery also have been reported.

Shortages of both skilled and non-skilled workers at Wichita, where nearly full-scale production is underway, have been serious. Now, Wichita had 111,400 gainfully employed, out of a total population of 240,000. Aircraft and parts manufacturers now employ 57,150, and report they will need an additional 4,000-4,500 by February.

▶ **Buy Airport**—To speed up training of crews, USAF purchased the Wichita Municipal Airport, adjacent to Boeing's B-47 plant, and established a jet bomber training base.

Training has been confined to transition—six weeks in T-33s, then three weeks in B-47s.

Combat training, when it comes, will require another six weeks. All pilots have 2,500 hr. or more before they are assigned to the Wichita base.

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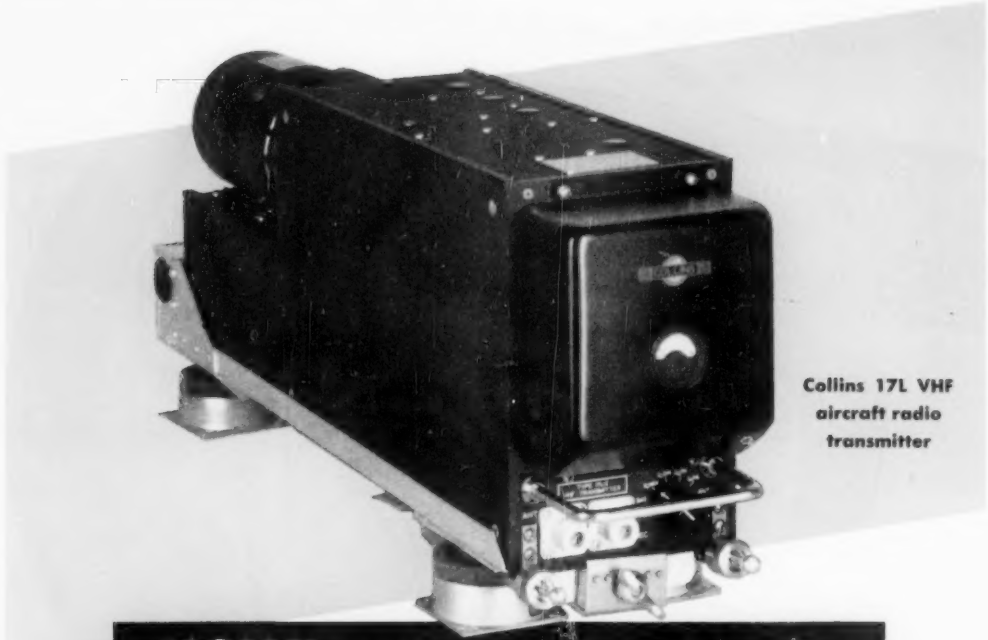

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Red Rockets

• Peenemuende center is back in full operation.

• Russians are testing four missile types there now.

By David A. Anderton

Four rocket-propelled guided missiles, including the anti-aircraft weapon "Wasserfall," are currently under test by the Russians at Peenemuende, former center of German guided missile activities.

Besides Wasserfall, the Reds are working with the A9, winged version of the V-2 rocket; the A5, half-scale V-2 used for control development; and an unidentified rocket of the V-2 type.

Peenemuende itself has been heavily fortified and has a group of about 80 MiG-15 interceptors assigned for its air defense. Launching ramps and new facilities have been added to replace and supplement those demolished by German engineers before the Russians moved in at war's end.

► **Russian Effort**—Just what has been going on behind that particular Iron Curtain has been kept secret during the past 6½ years. But like the U.S. atomic bomb project during the war, the physical size of the establishment at Peenemuende is just too big to hide or to camouflage effectively. Sooner or later, information is bound to leak out. And here is what is currently known about this Red rocket station.

First, Russian development work seems to have started where that of the Germans left off. Their choice of the Wasserfall and the A9 would tend to confirm this belief, because those two weapons were the last to undergo development testing by the Peenemuende crew.

Six new launching ramps have been built, presumably for missiles of the V-1, or Martin Matador type. These pilotless aircraft are launched up an inclined ramp or from an elevated, A-frame rack. They use some kind of initial boost to get up to flying speed.

Four of these ramps are on the eastern coast in the Peenemuende North area; two are near the shore of the Peene River, in Peenemuende West section. These may be located on the site of the Luftwaffe's ramps for its V-1 testing work during the war.

► **Missiles**—Wasserfall was—and presumably still is—a rocket-propelled anti-aircraft weapon. It weighed approximately 8,500 lb., was about 25½ ft. overall length. Its rocket motor used nitric

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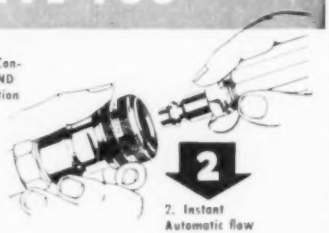

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acid and aniline as propellants. Cruciform tails and wings were fitted to the 3-ft.-dia. body. Almost 40 of these missiles were built and flown; about 25 flights were considered successful. Maximum speed was around Mach 3.

The A9 rocket was an attempt by the Germans to get more range from the conventional V-2. It was made from a V-2 to which a set of swept wings had simply been welded.

In theory, the missile was to be launched like the V-2, go through burnout to zenith of trajectory and start the descent in the normal manner. However at some point on the downward leg of the trajectory, the missile control system would feed in an angle of attack program intended to pull it out of the dive and into a long glide. As it reached the end of this glide, it would be given another signal and dumped into the ground in a nearly vertical direction.

Only three of these V-2 variants were built and fired.

Some of the Germans fondly hoped for a 500-mi. range, and some even considered the use of the A9 as the second stage of a two-stage rocket to bomb New York.

No serious engineering effort was ever expended in that direction, contrary to previous published reports.

The A5 rocket was a test vehicle built to study control systems for the V-2 (which is more correctly called the A4). It was a half-scale model, which would make it about 23 ft. long. And its powerplant was a so-called "cold" rocket, which used the decomposition of concentrated hydrogen peroxide to furnish superheated steam as the exhaust gas.

Not much is known about the fourth reported weapon. It is an artillery rocket of the V-2 type. The flame is reported to be "light blue" which does not indicate any of the standard propellant combinations.

► **Geography**—Peenemuende, originally a tiny fishing village, is on the triangular island of Usedom lying between the Bay of Stettin and the Baltic Sea. It takes its name from the Peene River, one of three branches of the Oder which empty into the Baltic. And its north and east coasts front on the Baltic.

Under the Germans, Peenemuende was divided into two areas, East and West. The former belonged to the Army, and was the real heart of the German rocket program. Peenemuende East was subdivided into two sections, North and South. Peenemuende West was the Luftwaffe's, and incorporated one of its development centers as well as an airstrip and buildings.

Peenemuende North was primarily a

Republic Thunderjet F-84E. The seven-foot-long cockpit canopy of this U. S. Air Force jet fighter is formed from a single sheet of PLEXIGLAS II. Canopy fabrication by Goodyear Aircraft Corporation.

It's What You *Can't* See That Counts

Transparent PLEXIGLAS enclosures, such as this canopy on the Republic Thunderjet, are familiar visible parts on all types of aircraft. But it is the properties you *can't* see—strength, light weight, formability, dimensional stability, resistance to weather—plus clarity, that have established PLEXIGLAS as *aviation's standard transparent plastic.*

An improved grade of this acrylic plastic—PLEXIGLAS II, with increased resistance to heat, weather, and crazing—is being used on many of today's military and commercial planes. And for aircraft of the future, Rohm & Haas laboratories are working to raise even higher the quality of transparent plastics.

To help you make the most efficient use of PLEXIGLAS, we will be glad to send you our new Handbook for Aircraft Engineers. It contains detailed technical data on the design and installation of aircraft enclosures.

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Now in service for Eastern Air Lines and soon in service for Trans World Airlines, Air France, B.O.A.C. Royal Dutch Airlines, Malayan International Airlines, Trans Canada Corporation and other leading airlines.

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AIRCRAFT

Look to Lockheed for Leadership

Lockheed

BOOSTS PROFITS FOR AIR CARGO OPERATORS

Air freight traffic has increased 467% since 1946, continues to grow at a rapid clip. During this period, Lockheed engineers worked steadily on the problems created by this fast-growing business and have come up with much-needed developments.

Some of these developments were recently previewed by airline executives and military officials in a 3-day seminar held at Burbank. It was revealed that Lockheed (1) has a new Super Constellation cargo plane designed to reduce freight-carrying costs, and (2) has thoroughly analyzed the problems of loading, tying down, unloading and handling of freight at airports. One exhibit was Lockheed's mechanically operated scale model of "the ideal air cargo terminal," which has attracted national attention.

The new Super Constellation cargo plane is the most highly mechanized freight carrier yet designed. Some of its outstanding advantages:

1. Solves major interior handling problems with three exclusive features: an all-metal (magnesium) floor, a built-in mechanical conveyor, and a portable, airborne cargo elevator of 10,000 pounds capacity.

2. Carries "more cargo farther and faster" than any other airplane.

3. Increases carrying capacity, both in total floor space and weight.

4. Guarantees greater profits because of its low direct operating cost—actually 4.9 cents per ton-mile.

The Super Constellation is the result of a decade of air cargo research at Lockheed. It combines the experience and dependability of the world-famous Constellation transport with greater size and greater operating economy.

It is 18.4 feet longer than the standard Constellation.

It will carry 38,500 pounds, or nearly 20 tons, across the nation.

It will carry over 25,000 pounds, non-stop from New York to Paris.

It has net usable space totaling 5,568 cubic feet, equal to nearly three standard railroad refrigerator cars.

And its metal watertight floor permits much heavier load limits (300 lbs. per sq. ft. or 1000 lbs. per running ft.), higher density cargo and a wider variety of cargo.

Military versions of this airplane already have been ordered in large numbers for both the Air Force and the Navy.

development area, and included rocket launching platforms. South was for laboratories and construction of test vehicles; there the buildings were located in the pine forest which blankets the eastern coast of Usedom.

The commander of the Red forces which swept across the island said that Peenemuende had been almost completely destroyed by the Germans, and that his orders covered the rest of the destruction. And so the Iron Curtain fell on weapon development activities at Peenemuende.

► **Expanded Airfield**—In addition to the Russian postwar weapons development, there has been considerable expansion of the German-built airstrip at Peenemuende West. It is now a three-runway field; the main east-west runway is intersected near its ends by a pair of strips at about right angles. Hangars are located south of the main runway.

Apparently the main runway has some sort of a radar-controlled approach system, because the western end sports a radar installation and the eastern end has an antenna system which is about 50 ft. high.

Earth revetments dot the eastern side of the field; height of the embankments is about 5 ft. The MiG-15s standing in the revetments are normally camouflaged with nets.

During the maneuvers held last fall, the Reds had some 180 planes stationed at this base; normal complement appears to be about 80.

Additional defense units include concentrations of 9-cm. anti-aircraft pieces stationed about 500 ft. apart along the northern coast. Red army units stationed in the area man large numbers of light anti-aircraft guns with no particular fixed set of positions.

A unit of the Seepolizei (which is the East German Republic's navy) is stationed at the shore of the Peene. It is equipped with armed trawlers of about 210-ton displacement.

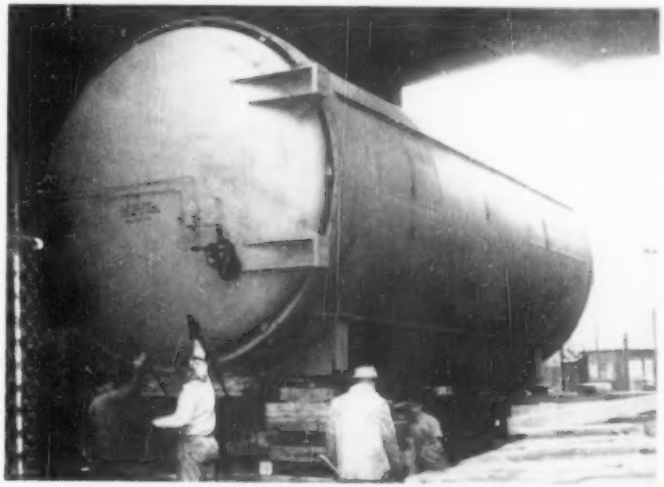
► **Importance**—Regardless of future plans for Russian missile development, it seems certain that the rehabilitation of Peenemuende and the size of the facility there make it important right now.

Recent information from European sources says that the Russians are beginning to concentrate their main missile development work at Kaliningrad (formerly the German city of Koenigsberg, 55 mi. NE of Berlin). When this transfer is completed, Peenemuende could continue as an educational facility or a test firing range.

The timetable for that transition and the type of experimental work continued at Peenemuende can be a very important clue to Russian endeavors with guided weapons.

Foreign Interest In Stall Indicators

British, French and Italian aircraft manufacturers are showing increasing interest in pre-stall instrumentation, ac-



HUGE VULCANIZER FOR AIRCRAFT FUEL CELLS

Huge piece of vulcanizing equipment for large size aircraft fuel cells recently was moved into B. F. Goodrich plant in Akron. This vulcanizer, a 40-ton steel cylinder 28 ft. long and 12 ft. in diameter, is shown as it was jacked off flat car for setting on foundation. A 144-ft. reinforcing ring for the installation had to be shipped separately. Equipment was manufactured by Struthers-Wells Corp., Titusville, Pa.

cording to Leonard M. Greene, president of Safe Flight Instrument Corp., White Plains, N. Y.

Prototype installations for 14 different types of foreign aircraft already are being developed by the company. The manufacturers are:

- **England.** Vickers-Armstrong, de Havilland, Fairey, Gloster, Hawker, Handley Page, A. V. Roe.
- **France.** Avions Marcel Dassault, Societe Nationale de Constructions Aeronautiques du Sud-Est (SNCASE).
- **Italy.** Macchi, Fiat.

During a recent trip to Europe, Greene inspected the big SNCASE 2010 transport, which has been fitted with the Safe Flight warning system and reports keen interest in its possibilities.

New Industrial Scholarships Open

National competition for 14 Sloan Fellowships in the executive development program at Massachusetts Institute of Technology has just been announced. Nomination by the employer is a prerequisite, since successful candidates must be granted a year's leave. Applications must be made at MIT by Feb. 23.

Candidates must be between 30 and 35 years old, with five to ten years of experience. Fellows will be in residence at the Institute from June, 1952 to June, 1953.

Qualities listed by the Institute as the basis for selection include managerial ability, intellectual capacity, sensitivity to the social and civic implications of industry and potential for industrial leadership.

Ten annual scholarships have been established by Utica Drop Forge & Tool Corp., Utica, N. Y., to prepare young men for industrial careers.

The scholarships, awarded on a competitive basis, provide for two years of residence, subsistence and training at the State University of New York's Department of Mechanical Technology —a part of the State Institute of Applied Arts and Sciences. Studies will be supplemented during the summer months by on-the-job training in manufacturing plants.

In 1922
SERVICE STEEL CO.
was a dependable
supplier of
AIRCRAFT
TUBING
On 1922 Henry Berliner made the first successful helicopter flight in the helicopter invented by Emile and Henry Berliner.

THRUST & DRAG

Capt R. C. Robson suggested in Cockpit Viewpoint for Dec. 24, 1951, that oil dilution increases the chances of combustion. He said, and rightly, that oil dilution by gasoline changes the flash point of the oil. But there is another side to the story. Spontaneous ignition temperature is as important a factor in fires as the flash point, which is only the temperature at which vapor ignites momentarily in the presence of a flame. Lubricating oil by itself shows a spontaneous ignition temperature around 450F; gasoline is up near 1,000F. Some NACA tests showed that in an airstream of 200 fpm. (which would be comparable with the flow through the inside of an engine cowling) oil ignited at 1,050F and gasoline went to 1,350F before it flamed spontaneously. Actually, the proportion of gasoline added in oil dilution should not raise the spontaneous ignition temperature of the oil appreciably. What all this says, then, is that oil ignites spontaneously before gasoline, that oil dilution by gasoline makes the mixture ignite at a not-appreciably higher temperature, and that in the presence of a flame all bets are off anyway.

* * *

One of the most useful of government publications is a new bibliography of material dealing with gas turbines and jet propulsion, and compiled at the National Bureau of Standards. Books published from 1910 to 1950 are listed, and periodicals from 1940 to 1950 are referenced. You can order the bibliography from the Government Printing Office, Washington 25, D. C., for 20 cents. Ask for NBS Circular 509, Bibliography of Books and Published Reports on Gas Turbines, Jet Propulsion,

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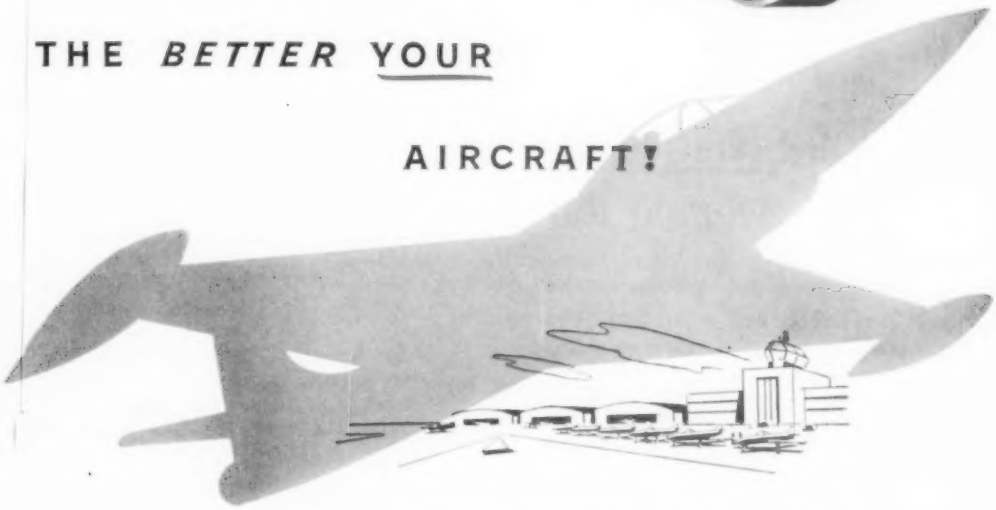

Jet propulsion is America's synonym for speed! Jet planes fly as fast as sound . . . gas turbines spin faster than 40,000 RPM . . . the industry itself is moving with such rapid strides that many jet aircraft become obsolete before leaving the experimental stage! Yet, Bower aircraft bearings are more than holding their own against the punishing demands of speed, load and temperature—meeting the constantly rising engineering standards of the jet propulsion field. ☆ Used by nearly all manufacturers of jet aircraft engines, Bower bearings are precision-built to tolerances measured in millionths of an inch. They operate with complete efficiency at temperatures as high as 600° F.—with minimum lubrication. ☆ Whatever your product—from high-speed turbines to electric motors—insist on dependable Bower bearings.

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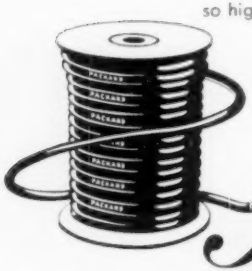
Packard

— the Preferred cable in the aviation industry

Packard has been associated with the aviation industry since its inception, for it was Packard wiring that was used by the early aircraft experimenters and pioneers.

As new problems arose pertaining to the safe and efficient conduction of electrical energy, Packard was ready with new processes and new equipment with which to meet them.

Small wonder, then, that Packard cable, so highly regarded by the industry as a whole, is the preferred wiring in both commercial and military aviation.



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Packard Electric Division, General Motors Corporation
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and Rocket Power Plants, by Ernest F. Frick and Carl Halpern.

* * *

Engineers were asked to help hard-pressed high-school teachers in vocational guidance in a plan being sponsored by the Engineers' Council for Professional Development. The Council also urged engineering schools to make substantial improvements in their courses of study so that what they are teaching does not become obsolete during the next two decades. Colleges were asked to concentrate more on the basic engineering sciences—math, physics, mechanics are examples—than on the engineering arts which specialize on one particular subject.

* * *

Benchmark for the state of British reciprocating engine development: Bristol's engine division rebuilt a test Hercules 634 engine from pooled parts of Viking powerplants. Some of the components had as high as 3,000 hr. running time. The engine was then run through a complete civil type test which lasted 110 hr. The test was a success. And the stripped-down parts were within the limits set for new engines about to go into service. Bristol is currently hoping for a 1,200-hr. rating for overhaul period.

* * *

A small supersonic windtunnel for research and instruction has been placed into operation at Rensselaer Polytechnic Institute, Troy, N. Y. Powerplant is a war-surplus Packard V-1650 (Rolls-Royce Merlin) reciprocating engine, which drives the tunnel up to Mach 3 through combination of pressure and suction means. The tunnel was completely planned and built within the Institute's department of aeronautical engineering. Test-section size is not specified but is presumably small and two-dimensional. It would vary, of course, with the test Mach number desired. Schlieren and shadowgraph apparatus are available.

* * *

Someone scoffed at the ability of Maj. J. P. Stapp to take a deceleration rate of 493G (Aviation Week, Nov. 26, 1951, p. 41) and wrote a letter asking if we ever bothered to check these "preposterous" statements put out by the Air Force. Not having instantaneous data to check, we bucked the whole business to the Edwards AFB people who confirmed the deceleration rate. And then they added this stopper: "You may be interested to know that human subjects have been subjected to deceleration rates of as much as 1,100G per second without detrimental results . . ." DAA

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A case history based on the experience of the Hyster Company, Portland, Oregon

By reproducing its engineering drawings on Kodagraph Autopositive Paper, the Hyster Company gets intermediates which have dense black photographic lines on a translucent, highly durable paper base. *Intermediates* which will remain intact in the files year after year . . . and produce sharp, legible blueprints and direct-process prints whenever needed.

And the cost is surprisingly low because Kodagraph Autopositive Paper boasts unique photographic properties which cut production costs *substantially*. It can be handled in ordinary room light . . . and it produces positive copies *directly*—without a negative step.

Furthermore, existing equipment can be utilized—Autopositive can be exposed in any blueprint or direct-process machine . . . and processed in standard photographic solutions. Hyster uses a blueprint machine which has also been designed to produce Autopositive intermediates in a continuous flow.

How The Hyster Company Uses Autopositive

For All Print Production. Autopositive intermediates are used instead of valuable and perishable original drawings. Producing sharp, legible blueprints and direct-process prints time after time, they greatly reduce the possibility of reading errors in the shop.

For "Permanent" Files in its home office . . . and branches in the United States and abroad. "Photolasting" Autopositive intermediates eliminate the costly delays experienced in the past when intermediates faded, turned yellow, or became brittle.

For Drafting Room Short Cuts. Autopositive Paper is used to reclaim old and weak-lined drawings . . . and to duplicate standard designs which will be incorporated in new drawings. *All of which saves hours of creative drafting time.*

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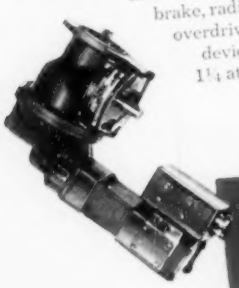
ROTARY ACTUATOR
for Tough Duty Cycle

Designed for stabilizer actuation in a long range bomber. Required duty cycle is one second full load one second off and one second full load in opposite direction continuous.

Conforms to requirements of ANM-40. Equipment includes magnetic clutch and brake, radio noise filter, manual overdrive and torque limiting device. Rated motor h.p. is 1¼ at 9000 rpm continuous.



EMERGENCY STAND-BY MOTOR
for use on Supersonic Research Aircraft

Designed to operate under high ambient temperatures of 70°C at 50,000 ft. altitudes. Duty cycle is 1 minute at 1 H.P. 30 seconds at 2½ H.P. High temperature materials used throughout. Motor weight, including gear box—22½ lbs.

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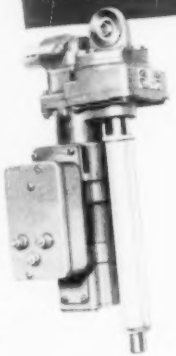
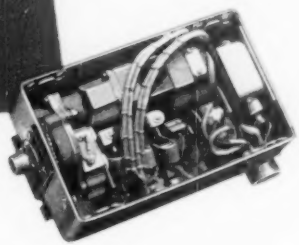
FEATHERWEIGHT LINEAR ACTUATOR
for Jet Wing Flaps

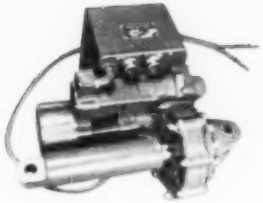
Two actuators are interconnected by flex shafting. Single brake operated by either motor provides quick and accurate positioning. Either motor can safely operate entire system in emergency under any condition of ambient temperature and maximum operating load with supply voltage as low as 20 volts. Weighs only 8 lbs., 3 oz.





COMPACT ROTARY ACTUATOR PACKAGE

Entirely self-contained rotary actuator package combines compactness, high performance, and light weight. Totally enclosed in a metal box, it incorporates motor, magnetic clutch and spring loaded brake. The unit provides continuous elevator correction on one of the latest jet fighters through the automatic pilot.

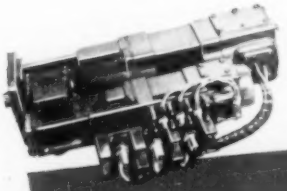


DOUBLE MOTOR POWER UNITS

These radical motor arrangements use a small, continuous duty motor operating through a gear reduction to trim aircraft in automatic flight and a large intermittent duty motor for manual operation in maneuvering.

One unit is a complete motor actuator. The small, continuous duty motor of 1/10th h.p. provides a rate of travel of 6/100" per sec. to the screw jack; the large, intermittent duty motor of 3.3 h.p. operates screw jack at a rate of 7/100" per sec. Normal operating load is 11,000 lbs... 28 volt operation. Equipment includes overload and travel limit switches, radio noise filters, position indicator and non-jamming stops.

The other unit illustrated employs a small motor of 1/15 h.p. with integral gear reduction and a large 3.3 h.p. motor with direct drive of 12,000 rpm.



EEMCO

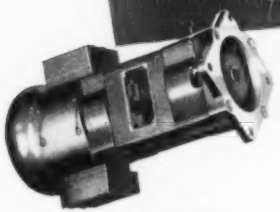
TECHNICAL BULLETIN

Special Actuators and Motors for Today's Special Aircraft

Fool-proof power units to actuate controls in conjunction with the automatic pilot are primary factors in the advancement of automatic flight. EEMCO helps the industry build for the future by designing and manufacturing motor actuators that keep pace with the far-reaching demands of planes on the drawing board.

The EEMCO designs briefly described in this bulletin are a few of the more advanced units designed and produced during the last year in cooperation with leading aircraft manufacturers.

ELECTRICAL ENGINEERING & MFG. CORP.
4612 West Jefferson Boulevard, Los Angeles 16, California



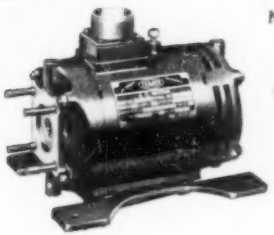
HYDRAULIC PUMP MOTORS

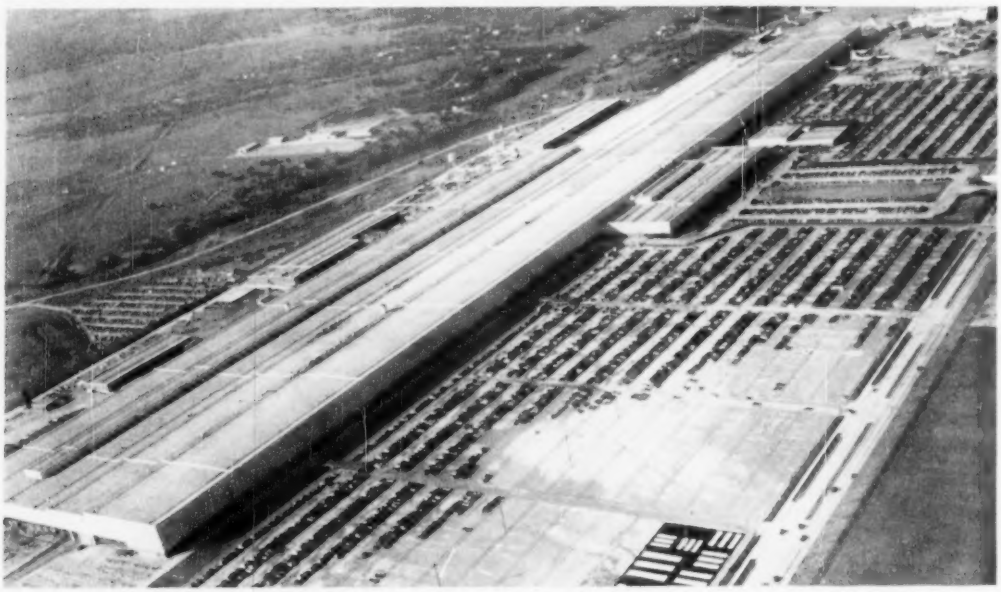
Save space, weight—increase efficiency. Light compact pump drive assemblies are achieved with special EEMCO motors designed to couple directly to new type high speed hydraulic pumps, thus eliminating conventional gear box.

Motor # 1 was designed for an allowable pump speed of 7200 rpm and mounts directly on the pump with an internal spline drive within the armature shaft providing the coupling.

Motor # 2 provides these same advantages by coupling directly to a hydraulic pump which operates at 11,200 rpm.

Can be supplied with integral gear box and standard A.N. mounting pad for operating lower speed pumps.





CONVAIR'S FT. WORTH PLANT is 4,000 ft. long. Assembly line starts lower left, completed B-36s emerge at upper right.

Convair Set to Turn Out B-60 on B-36 Line

Quick changeover to eight-jet production possible because 72% of parts identical to present bomber.

By Irving Stone

Ft. Worth—Convair's giant swept-wing eight-jet YB-60 probably will be fabricated on the present B-36 line, if the company gets an initial production order for the new bomber. Adaption of this production line for the B-60 should be made with little complication.

One of these all-jet heavies, except for the Pratt & Whitney J-57 engine installations, was completed last October, after a relatively brief eight-month period in Convair's experimental hangar adjacent to the main plant. A second ship also is under construction, probably now at the near-completion stage. The first YB-60 could have flown before January, 1952, Convair officials say, if engines had been made available.

▶ **Built on Proven Base**—Reason for the quick fabrication job on the new plane is that about 72% of the parts are identical with those in the B-36. Detail parts for the YB-60, except for some minor units, were made up in the B-36 fabrication area from new detail tools to accommodate the changes made in the transition from the basic B-36 structure.

This rapid progression from the B-36 to the YB-60 indicates a comparatively low cost for a new plane. Originally it was planned to make this aircraft another model in the B-36 series, but a new designation was considered justified by the new configuration and greater performance—the YB-60 should have about 80,000 lb. thrust available from its eight J-57s, as against the equivalent of about 42,000 hp. in the B-36.

▶ **Differences**—Basically, the fuselage of the B-60, from aft of the cabin to near the end of the tail, and also the center portion of the center wing, remains the same as in the B-36.

The nose cone is lengthened to accommodate more equipment, and the tail cone is modified to house a braking chute and support a tail wheel.

At the extremity of the center portion of the center wing a pie-section structure is inserted to give sweep to the leading edge of the outer center section and outer panel. A cuff on the center part of the center section continues the leading edge sweep to the fuselage. Also, over the center part is another fairing for the wing top surface.

The pod structure for the J-47 on the B-36 is not used in the YB-60. A new arrangement has been built for the J-57 installation.

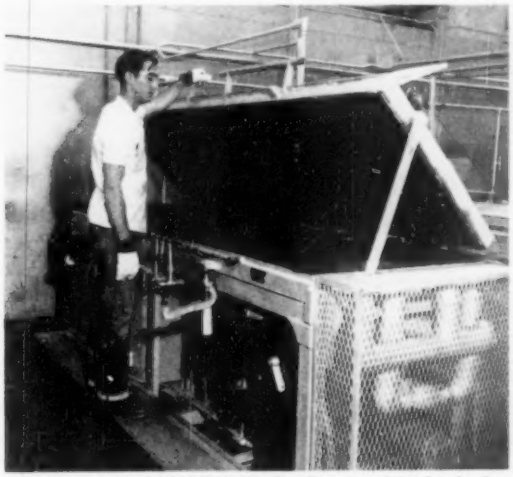
▶ **Tremendous Job**—Until orders for the B-60 are obtained, Convair continues to concentrate its Ft. Worth effort on the B-36. Fabricating this plane and the B-60 will be in a similar production category—represents an extreme in aircraft construction. For the B-36 is the largest plane in production. It is assembled on the aviation industry's longest production line.

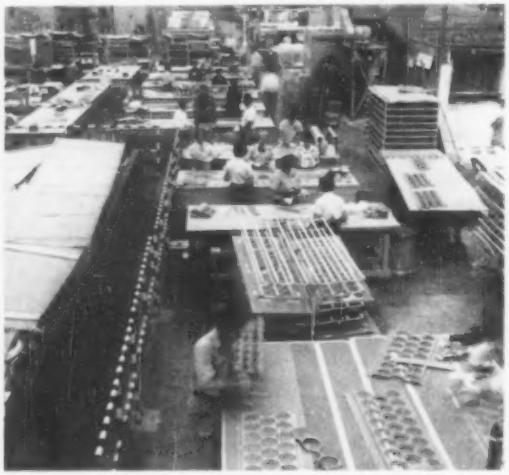
Yet the flow and assembly scheme is a relatively simple one—the raw material comes in at one end of the 4,000-ft. line, the finished plane comes out at the other end.

The magnitude of the fabrication job is driven home forcefully when you pass along the assembly stations and see the huge-diameter 162-ft. fuselage, the massive wing that rises to a 7¼ ft. root thickness and stretches across 230 ft.

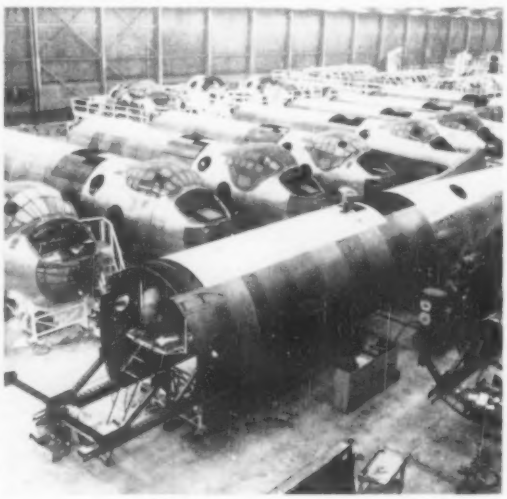
Essentially most of the problems involved in putting this mammoth bomber together are similar to those encountered with other planes. Dif-

LATEST FLIGHT VIEW of a Convair RB-36, reconnaissance B-36, equipped with four jets, six pusher-type piston engines.





ALONG ASSEMBLY LINE—Metlbonding (top left) bonds skin surfaces together after they are taken from processing tables (top right). Subassembly and major assembly of B-36 bomb bay are shown lower left, and at lower right is an overall view of nose-forward bomb bay primary line, with pilots' enclosure assembly in background.



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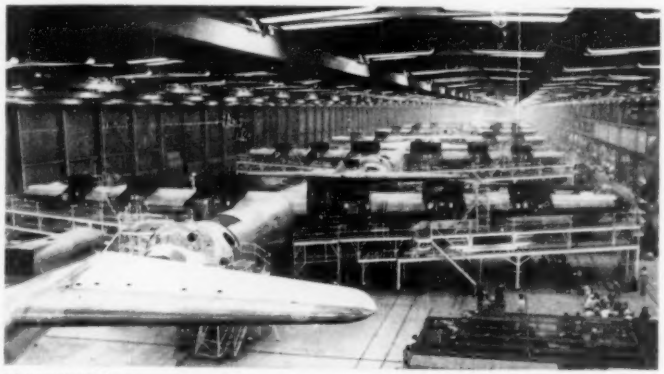

ELECTRICAL harness installations follow; flaps are hung, control rigging installed.

ferences are simply a matter of degree. The manufacturing cycle is longer, the great number of shop-made parts (68,000) and different assemblies (8,500) for each plane add to the volume of troubles which would be normal for the industry.

► **Extreme Conditions**—But the cumulative know-how required for the B-36's blend of design and production is peculiar to this particular plane. Flight to an altitude of 50,000 ft. (25- to 30,000 ft. higher than for transports) in a relatively short time may be associated with a temperature change of 200F—and bring severe problems calling for special design refinements and production attention for almost everything that is hauled up to this height. Not only are there more parts and things in the B-36,

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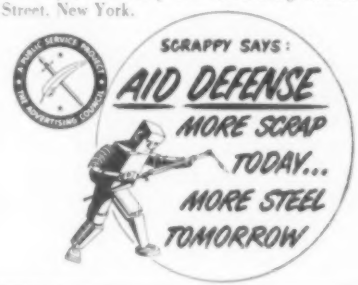

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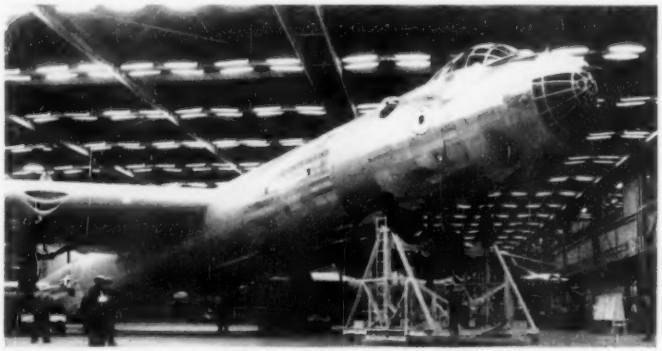
FINAL ASSEMBLY—Inboard leading edges are installed, final checks made. Then . . .



NOSE HIGH and sideways, an RB-36D is ready to be pulled out of assembly plant.

but the stay at altitude is longer.

Just one example of the production difficulties is found in sealing the integral fuel tanks. Here, there is as much as a 64-ft. hydrostatic head as against a substantially lower height in the usual run of aircraft.

And because of the inherent size of the plane and the volume of its equipment, changes are more extensive than ordinarily encountered, and each of these changes can cause a minor "convulsion" on the production line.

Yet the learning curve—production efficiency—is practically identical with the industry average for all types of aircraft, say Consolidated Vultee Aircraft Corp. engineers.

▶ **General Layout**—The Ft. Worth plant originally went into operation in March, 1942, as an assembly facility for B-24 Liberators. It ran 320 ft. wide (two 40-ft.-high bays, 200 and 120 ft.) by 4,000 ft. long. In late 1942 it had become a self-sustaining aircraft plant and a 350-ft.-wide addition was added for a length of about 2,500 ft. along the original 4,000-ft. stretch. The new bay was used for the manufacture of production tools and parts for the B-24.

The B-36 production scheme utilized the existing heavy machinery installations in the fabricating area, because the cost of moving these units would have been prohibitive. The height of the B-36 dictated the use of the high bay stretch, and the small order of 100 (in 1945) and the low production rate originally planned made the long assembly line preferable to building more expensive high-production-rate tools which would have shortened the line. But the production scheme does stress maximum transportation distances for feeding materials and parts into the line.

Here's the overall flow plan for producing the B-36:

▶ **Initial Work**—Tooling department and fabrication area are adjacent to each other. Tooling is housed in a two-story arrangement with the ground floor used for the heavy machine tools employed in making the production tools. The upper section accommodates light machines for making templates, form blocks, etc.

Raw stock is fed to the fabrication area from an adjoining materials warehouse. In this area are applied the various processes for making up the detail parts for subassembly—shearing, forming, drawing, stretching, anodizing,

for example
LOCKHEED F-94 INTERCEPTORS...
on the production lines at Lockheed plant at Burbank, California.

Rugged all-weather F-94 jet interceptors are rolling from the production lines at Lockheed plant in Burbank, California. These powerful fighters are equipped with radar to find targets despite darkness or bad weather, and afterburners for bursts of extra speed. The planes are an advanced development of the Lockheed F-80 Shooting Star of Korean combat experience.

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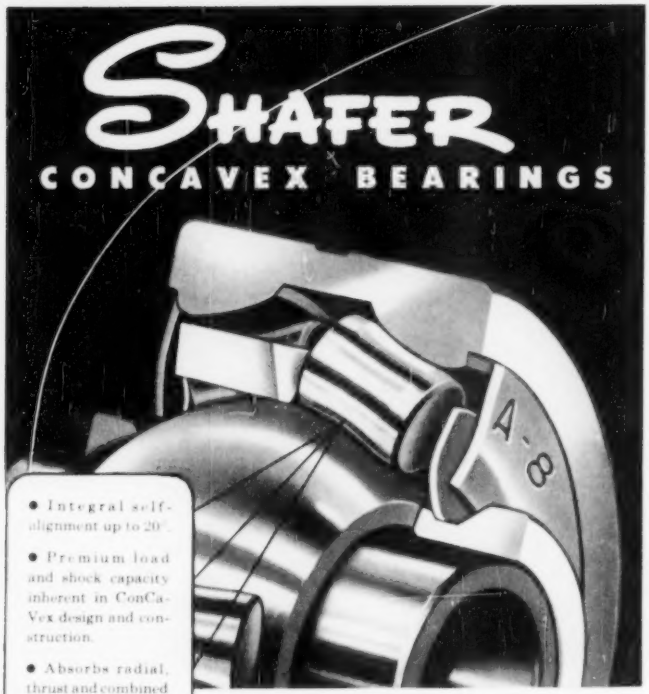

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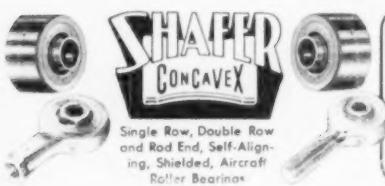

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heat treating, normalizing, painting, welding, etc.

From fabrication, most of the parts are lifted by elevator to a subassembly mezzanine, directly above. After working, they are brought down by elevator or monorail, according to size of components, and routed directly to the major assembly area abutting the fabrication area.

Some of the subassemblies are routed forward to stockroom serving the final assembly stations.

▶ **4,000-Ft. Line**—From warehouse to fabrication to major assembly the flow is across the width of the building to where the straight 4,000 ft. line begins, with major assembly its start.

From here, the fuselage and wing components (nose, bomb bay, tail, horizontal and vertical stabilizers, and wing center section) go forward to major mating stations. Two of these stations are used, to spread the work and provide an insurance factor to pick up lags in production.

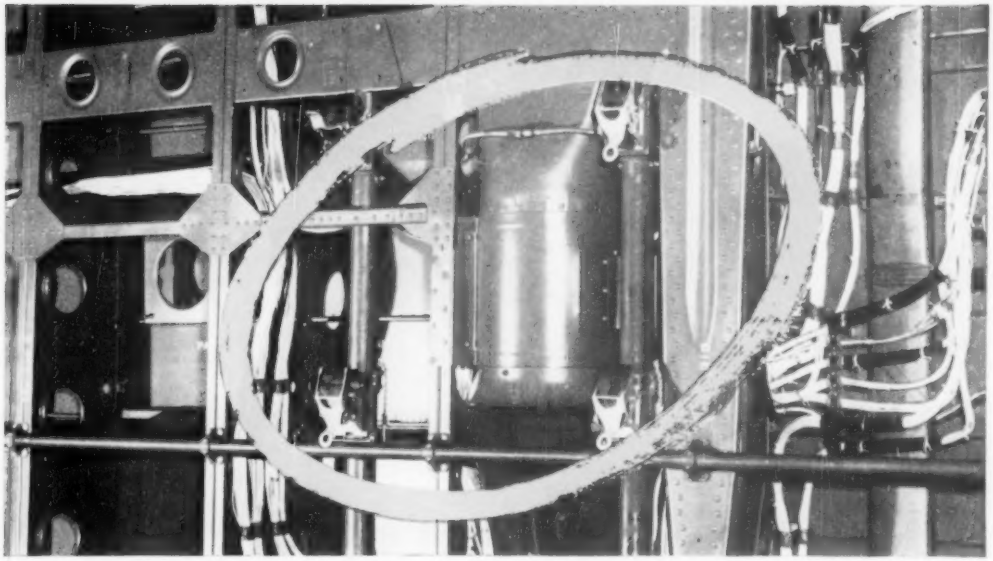
Major mating progresses into the final assembly line, comprising 11 stations. Adjacent and parallel to these are the areas for buildup of components installed on this line—ailerons, armament, outer panels and engines (separate areas are used for marrying ducting and nacelles to jet and piston plants). In addition to these feeding areas, which serve eight of the final assembly stations, parts come into the line from a subcontract parts warehouse. Remaining three final stations of the 4,000 ft. line are used for checks of the various systems—electrical, hydraulic, armament, etc.—and Air Force production inspection.

▶ **Check Routine**—From the assembly line, the B-36 is towed to various check stations—revetment for gun trial, radar check, compass rose, engine runup area for check of systems using powerplant drives.

After this the plane goes to company flight, then is returned to remedy conditions which were the subject of flight squawks. Next step is to the AF inspection station, then to AF acceptance flight, which is followed by routing to loose equipment area for bomb racks, turret and engine covers, etc. Final step is to delivery row for AF ferry crew.

That's how Convair puts the B-36 together and gets it to the AF.

In this design and production effort at Ft. Worth, Convair employs more than 31,000 people, exceeding the World War II peak figure—30,609—achieved in November, 1945, at the height of the B-24 output. Of the present figure, about 5,000 are women, more than half of whom are in the factory, others in production control and tooling. But women employes are still less than half those engaged in the peak B-24 effort.



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The Fairchild Packet must be ready at all times to carry airborne troops or supplies to forward areas. The wings of parked aircraft, however, sometimes become coated with ice or frost which may literally stop them cold. To minimize this possibility, Fairchild engineers designed a forced hot-air system for wing-panel de-icing while the plane is on the ground. Two Joy AXIVANE Aircraft Fans supply combustion and ventilating air to eight 400,000 BTU heaters. The heated air can be valved either into the wing panels or into the cargo and cabin space. No space is wasted by the fans, since their compact size permits them to be installed between the vertical fuselage frames.

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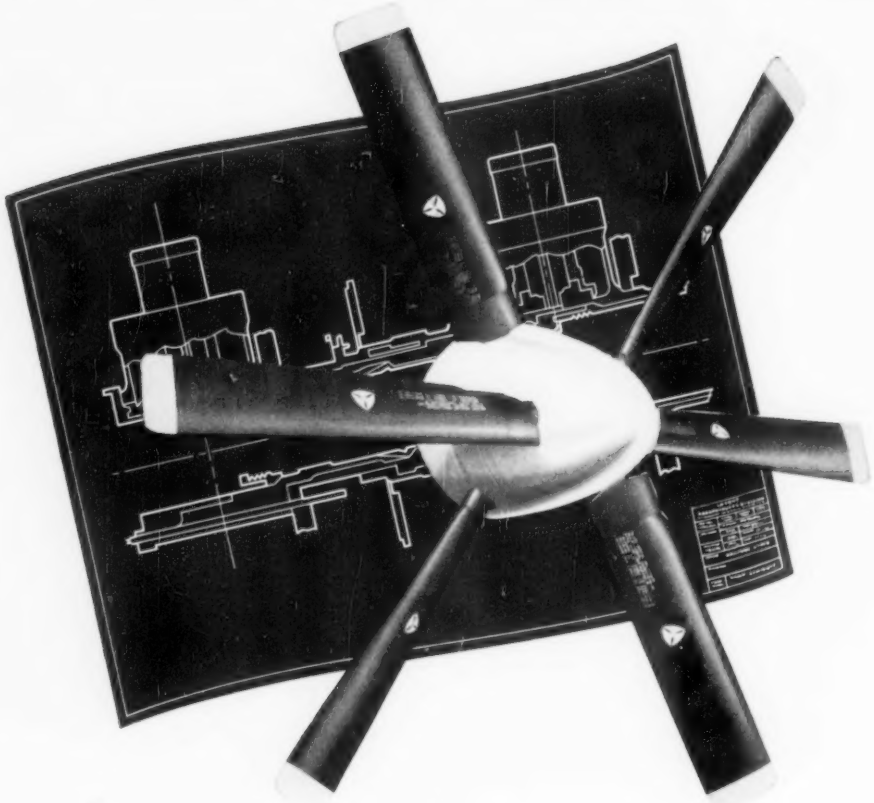

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Two Merger Pacts Are Announced

Elastic Stop Nut Corp. of America has signed a merger agreement with American Gas Accumulator Co. Agreement will be considered during a special stockholders meeting in February. Also, Martin & Schwartz of Salisbury, Md., has merged with Wayne Pump Co., Ft. Wayne, Ind.

In the former case, AGA's business will be handled as a division of Esna utilizing AGA's present management. AGA makes principally aviation ground lighting equipment, aids to marine navigation, time-delay relays used in electrically controlled circuits and traffic reflector signs and signals. It has plants in Elizabeth, N. J., Chicago and Toronto, Canada. Esna manufactures self-locking nuts and nails and the Roll-pin hollow, split, cylindrically formed fastener.

In the Martin & Schwartz-Wayne Pump merger, W. H. Bateman, previously head of the former firm, has been elected president of Wayne Pump, and C. E. Franks, former president of Wayne Pump has been named chairman of the new board of directors.

For the time being, M&S and Wayne Pump will handle sales of their products separately, but both lines will utilize Wayne's extensive service setup.

Lockheed Backlog $1.28 Billion

With a mushrooming military and civil plane backlog currently hitting $1.28 billion, Lockheed Aircraft Corp. is planning to step up further its outside spending. It now runs to 52 cents of every manufacturing dollar, should rise to about 69 cents in the next two years. Of the 69 cents, 55 cents is expected to go to major subcontractors capable of producing entire subassemblies.

In the past year Lockheed has patronized some 4,000 outside companies, of which 3,000 were small businesses. In the next two years, 5,000 firms are expected to be fitted in Lockheed's production plans.

The big backlog figure includes contracts nearing signature—firm orders total $946,306,000 as compared with $447 million a year ago. Military business takes 89.6% of the backlog and civil orders account for 10.4%.

The big West Coast plane maker's sales for 1951 are expected to approximate $235 million, a 35% increase over 1950.

Extra cost of make-ready and increased taxes are expected to continue to limit operating profits for the second half of this year.

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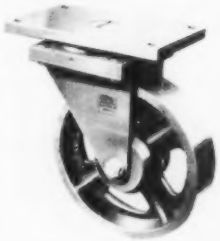

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Military Aircraft Roll Down the Lines

BOEING B-47 STRATOJET crew compartment sections are arranged on double-decker assembly (left) to speed installation of complex systems and other equipment. The crew compartment is one of the B-47's four major fuselage sections, the others being the nose cap, bomb bay and aft section. This view was taken at Wichita. Some measure of the big six-jet bomber's production complexity may be gained from the fact that 52,000 parts go into the big plane, exclusive of rivets, bolts and engine components. New type materials are used and external finish has to be kept fine. Subcontracting accounts for about 40%, on a dollar volume, of the B-47's assemblies. Wichita plant makes crew compartment, bomb bay section, all of wing except the control surfaces.

VOUGHT F7U CUTLASSES are seen on (right) final assembly line at Dallas, which is turning out large numbers of the 700-mph.-class fighters for the Navy. Tremendous increase in performance over relatively slower World War II fighters dictates need for fine precision work, even on a production-line basis. Necessity of incorporating many more items of equipment complicates the process. Small working space in a fighter-type aircraft is still another major problem. Latest production version of the Cutlass, the F7U-3, is powered by two Westinghouse J-46 jets fitted with afterburners. One of the most radical planes yet ordered for squadron service, the Cutlass typifies the new high-performance fighters being prepared for carrier service with the fleet.

LOCKHEED T-33 jet trainers near completion (left) at Van Nuys, Calif. In production for three years, the two-place T-33 was to go on an electric-powered assembly line basis Jan. 2 in an attempt to meet the demand from USAF, Navy, Marines and at least five foreign air forces. The new production scheme will provide specific savings of 46% in manufacturing-aids hours, 23% in working space, 4% in major tooling time, reduction from 12 to seven in fixture-to-fixture transfers required, among other benefits. Such gains are possible when sufficient orders are placed to permit major re-arrangement of production layout and use of mass output techniques.

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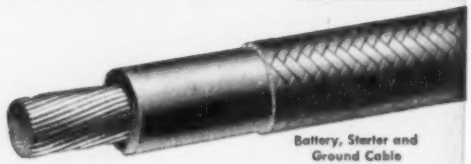

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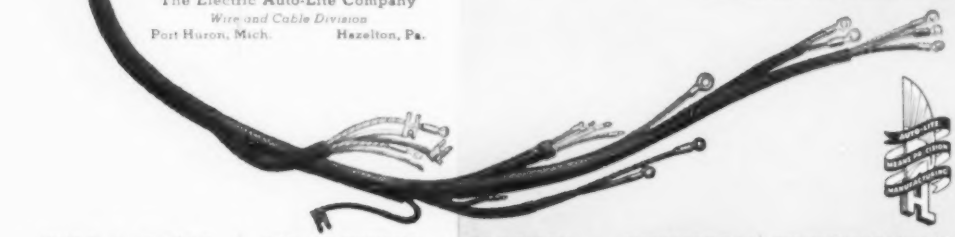

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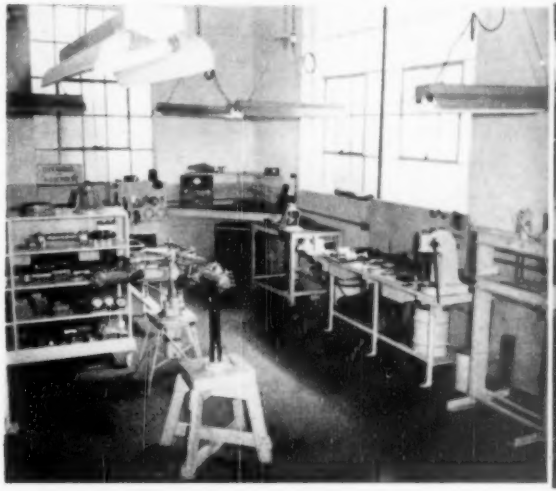

CORNER view of Los Angeles Airways helicopter overhaul shop.

MAIN ROTOR hub assembly of an LAA Sikorsky S-51.

LAA Uses Many New Operational Methods

Airline modifies its copters to meet needs; sets up a simplified system of maintenance routine.

By George L. Christian

Los Angeles—"Operating a helicopter airline is comparable to running a model shop. There is no precedent to follow and you have to invent practically everything you do," Clarence M. Belinn says.

Belinn ought to know. He is president of Los Angeles Airways, first helicopter airline in the world.

Currently delivering mail and freight with three Sikorsky S-51 copters, the airline had to make several modifications to the basic airframe to bring it up to maximum utility for mail pick-up and delivery operation. Here are some of the most important ones observed at the airline's main overhaul and operating base at Los Angeles International Airport:

• **Exhaust system was moved** to the right side of the helicopter to keep the exhaust fumes out of the mail handlers' faces.

• **Sight fuel quantity guage** runs about two-thirds the depth of the starboard windshield. The transparent tube shows fuel quantity positively—there are no moving parts to break down. This, incidentally, is an example of the positive approach and trend to simplicity characteristic of Belinn's philosophy on how an airline should operate.

• **Fuel booster pump** modification turns the booster pump on automatically in case of main engine fuel pump failure. This was deemed necessary because the pilot is so busy on takeoff that he should not be required to turn the booster pump on manually.

• **Fuel transfer system** has been installed to give the pilot some control over the craft's center of gravity. CG is a critical problem in helicopter operation, according to LAA officials. The two fuel tanks are located directly fore and aft of the engine and transferring fuel from one to the other will have considerable effect on the CG.

• **Cowling modification** has changed original overlap type joint to butt type. Now any individual piece may be removed without disturbing adjacent panels.

• **"Bustle" modification** expanded mail capacity of the after fuselage from a total of 145 lb. to two compartments with capacities of 300 lb. (upper) and 150 lb. (lower) respectively.

• **Oil tank, battery** and electrical control box were moved forward of the engine to give more space and take care of CG requirements.

• **Flood and spotlights** were installed to allow night mail delivery. The flood picks out the heliport's general location, the spot takes over to give the pilot a hand for the actual landing. Floodlights on the left main landing gear illuminate fore and aft baggage compartments.

• **A flight recorder**, made by Bendix and recording on film, is being tested experimentally to keep tabs on main rotor rpm. Tests are too new to prove conclusive.

• **Tail rotor guards** were installed to protect the anti-torque rotor from fences and other hazards.

• **VHF radio** has been installed. It allows the pilots to be in constant communication with LAA's operations office at Los Angeles International Airport.

▶ **Maintenance Maverick**—Belinn said that, after 12 years of work, he had perfected a maintenance system that was a model of simplicity and is noteworthy for its elimination of much unneeded paper work.

It might be termed the "Key" system.

The maintenance manual contains the usual detailed description of each job to be done on the helicopter at a given time. But it goes one step further. Through a series of keys or symbols (currently M-1 to M-18), each operation is tied in laterally to any other activity

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ONE OF THREE S-51 copters used by LAA to carry mail and cargo in Los Angeles area.

associated with that particular job.

For instance, when job M-1 is performed, the key M-1 ties that operation to the accounting, engineering, training and any other departments that might be concerned with job M-1. Thus each job performed on the copters is neatly wrapped up in individual bundles, each held together by a key. And Belinn keeps his finger on every facet of his whirling airline by not allowing a single change to the manual without his personal OK.

Clear definition of duties allows mechanics to make the utmost use of their time. As Belinn put it: "I don't want to waste my genius' time examining screw heads."

As a matter of interest, and as a basis of comparison for fixed-wing airplane operators (and potential helicopter users), here are some overhaul times for the airframe, engine and components as revealed by Harry Botterud, Supervisor of Inspection and S. E. Brown, General Maintenance Supervisor.

• **Inspection periods** for the engine and airframe are: Trip (pre-flight); daily; 40; 80; 120; 240. Another inspection is scheduled at 480 hr. for the airframe only.

• **Airframe major overhaul** is set at 3,000 hr., the engine (R-985) 1,000 hr. Application is in for engine time extension to 1,100 hr.

• **Main rotor head** is examined at 240 and 480 hr., the main gear box at 500 with application for extension to 600 hr.

• **Main rotors** have the same inspection periods as the airframe with a maximum life of 2,200 hr.

• **Tail rotors** are inspected at 480 hr.

Average number of hours accumulated on the S-51s to date is 4,500.

► **No Frills**—Belinn stressed that his company "spends all its money on wages, materials and good equipment . . . doesn't waste any on fancy stuff. We are a compact organization; overhead could run us."

And a tour of LAA's facilities confirmed the lack of frills. Maintenance shops were amply equipped, but no unnecessary, expensive equipment collected dust in forgotten corners. Offices were simple. And an Edison Televoice writer enabled one girl to handle the correspondence for ten men plus handling the duties of secretary to the chief accountant. LAA officials estimated the system saves them some $800 a month.

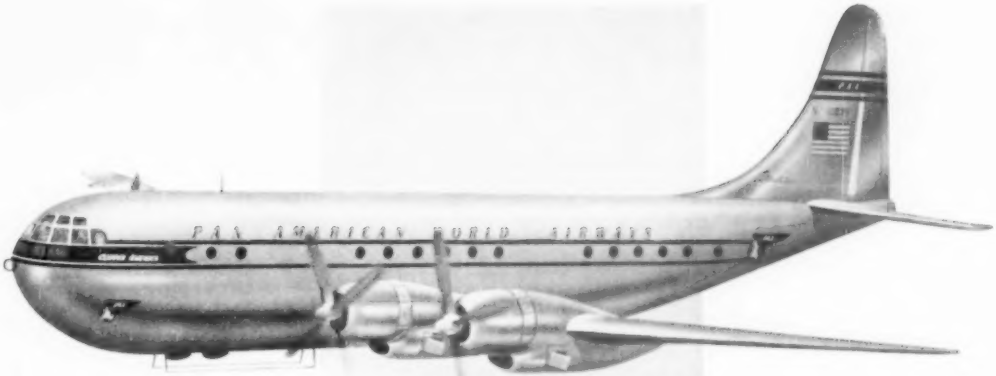
► **On-Time Performance**—One of Belinn's fetishes is having his egg beaters operate on schedule. To this end, an automatic flight timer is taking shape in the shops. The device will turn on a light whenever a helicopter is due at a stop. Pilots checking in by radio will enable the checker to tell at a glance how close to the all-important schedule he is.

A 2½-hr. ride around one of LAA's air mail routes showed how apparently casual, but actually how exacting and on-time the operation is. The route leads from the L.A. airport to Compton, via several stops to Monrovia on the north; from Monrovia, via several more stops as Pomona and Ontario to the eastern terminus, San Bernardino; south to Riverside and Corona; then back to the airport.

In spite of the numerous stops, including one to take on fuel, the copter was never appreciably off schedule and arrived at destination exactly on time.

The postage stamp-size heliports were located in various sorts of locations. Some were at small, private airports, a couple at fair grounds, some in back yards, vacant lots or fenced-off portions of school play grounds.

Each heliport is equipped with a miniature wind sock. Any high obstruc-



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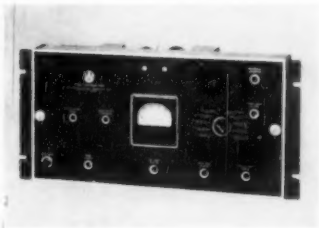

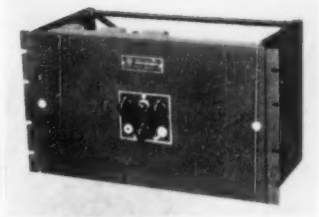

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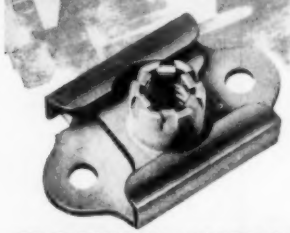

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tions such as flag poles are clearly marked with bright red pieces of Scotchlite, the irridescent reflecting material gaining in popularity in airline circles for such uses as fuselage decoration and insignia illumination. White pieces of the material outline the helports for night identification. The copter itself is well lit up, having flasher lights on each side, top and bottom, plus white lights on pylon and tail cone.

Flying the route was deceptively simple. At one point the S-51 operates across the mouth of Cajon Pass, where dangerous winds can be encountered under certain atmospheric conditions. But, as the rotary-wing aircraft become speedier and more powerful, adverse affects such as this will no longer be a factor in the craft's operation.

▶ **Passengers Next**—Belinn is casting a confident but cautious eye to the day when he can put passengers aboard his helicopters. The door is wide open. The CAB authorized him to carry passengers (AVIATION WEEK July 23, p. 55), and he is expecting the delivery of two eight-passenger Sikorsky S-55s in the near future. With these he will be able to cut travel time over a typical route segment from 45 to 10 min.

As anxious as Belinn is to haul humans along with his mail and cargo, he does not expect to inaugurate passenger service before summer or early fall, 1952.

"Copters are in the stem-winding stage," Belinn says. The current method of power transmission, through a "mess of clutches, gears and shafts is just a crutch which must ultimately develop into the logical way of applying power to the rotor—which is at the rotor tip and not at the hub." This will eliminate the anti-torque rotor and its associated, complicated, heavy drive-mechanism.

Belinn is extremely pleased with his Sikorskys. He pointed proudly to October, 1951, when two S-51s, which can haul 700-800 lb. each toted a record 445,000 lb. of mail and freight.

And that is a lot of payload to carry when you consider that pint-sized Los Angeles Airways employs some 45 persons (of whom eight are pilots), currently operates three S-51s, has a monthly payroll of $12-14,000 and flies about 32,000 miles per month.

Speaking of heavy loads, Belinn said that the all-time record mail loads were set on Mother's Day.

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H-S Builds Cockpit Air Conditioners

Hamilton Standard Division of United Aircraft Corporation announces that it has received substantial orders for aircraft cockpit refrigeration units.

Destined for both the Air Force and the Navy, units are to be installed in USAF F-86D and H Sabrejets and F-94C fighters and Navy FJ-2 Fury, F7U Cutlass fighters plus the R3Y turboprop flying boat, according to the manufacturer.

Ham-Standard says it is supplying the entire air conditioning system for the F7U.

Lear School Gives L-2 Autopilot Course

Anticipating the day when autopilot installation on private and executive aircraft will be common-place, Lear, Inc., recently inaugurated a service school for its pint-sized L-2 automatic pilot.

Lear invited each member of its world-wide distributor organization to send a representative to the classes, many of them conducted by William Lear. Instruction was given in theory, installation and servicing of the L-2 unit. Housing, meals and instruction were provided at no charge.

The company says that 85 students, representing 64 Lear distributors in 55 cities in the U. S., Canada, Latin America and Europe, attended this first session.

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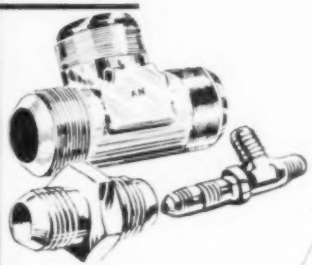
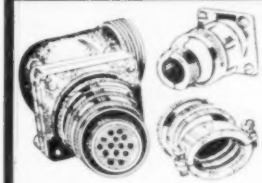
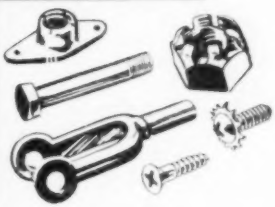


Electrical Fittings



Bolts, Nuts and Screws, etc.



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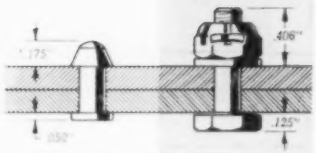

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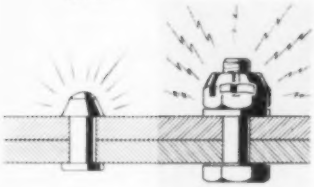

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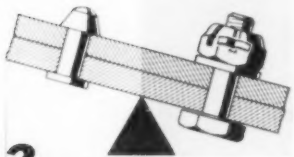

3 less weight . . . . . .

Hi-Shear rivets are the lightest high strength fasteners available.

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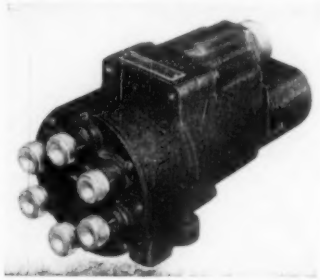

Coaxial Switch

A new and compact double pole double throw coaxial RF switch, designed to save weight and space in aircraft by taking the place of two SPDT switches, has been announced by Transco Products, Inc.

The switch, built to operate under extreme temperature and shock conditions, is available in various models conforming to military requirements, has straight end connections and is simply and easily mounted, says the maker. It is operated by motor instead of solenoid and is available in types suitable for frequency ranges up to 11,000 mc./sec.

Transco Products, Inc., 12210 Nebraska Ave., Los Angeles 25.

Lightplane VHF

An improved airborne radio set, combining VHF and low-frequency communication facilities, has been developed for lightplanes by Lear, Inc.

The set, identified as the LTRA-6, includes a VHF receiver, crystal-controlled, 12-channel VHF transmitter and a low frequency receiver. The VHF receiver, as described by Lear, includes a rugged, highly stable inductive tuning unit used in conjunction with a specially engineered oscillating circuit to provide increased accuracy and stability of calibration.

Weak signals, the company states, are amplified with greater effectiveness by an RF amplifier circuit which incorporates a new 6BK7 tube designed to reduce noise and raise sensitivity. A noise limiter circuit supresses ignition disturbances.

The 12-channel VHF transmitter is said to offer improved audio fidelity and has plug-in type crystal for easy accessibility. The low frequency receiver has improved sensitivity, better image rejection and a special antenna compensator to meet variations in installation, according to the firm.

When used with the Lear Omniscope and Omnipack, the new set provides the pilot continually and automatically with magnetic bearings for navigating the omniranges. With the Lear VCIX indicator and VCA adapter, the equipment permits utilization of the ILS runway and localizer signals and visual-aural ranges.

Lear, Inc., 11916 W. Pico Blvd., Los Angeles 64.

Buried Capacitors

Sprague Electric Co. has developed a ceramic capacitor for VHF and UHF application in which the capacitor element is a tiny disc buried in the head of an ordinary threaded fastener.

The capacitors, button types, are rated at 500v. d.c., in values up to 1,000 mmf. Sprague lists these advantages:

- **Minimum ground inductance** of a fixed value for better mechanical and electrical uniformity, allowing higher circuit gains to be used.
- **By-pass path** to ground is short and radially uniform. Lug terminals at tube socket height provide sturdy tie points for multiple connections and permit short, uniform lead lengths.

The company says thorough shielding of the capacitor element is attained by recessing it in the metal head of the threaded fastener. The button-type capacitors are available in various fastener versions, including those with self-tapping or standard threads.

Sprague Electric Co., North Adams, Mass.

Better Shaft Seal

A tough mechanical shaft seal, reportedly containing a number of new design features to meet high pressure, high temperature and high rpm. applications has been developed by the Cartriseal Corp.

The seal, already proven out in oil and fuel pumps, hydraulic transmissions and other equipment, consists of ma-

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I want to test MICROTOMIC against its 3 closest pencil. Send ___ degree MICROTOMICs please.

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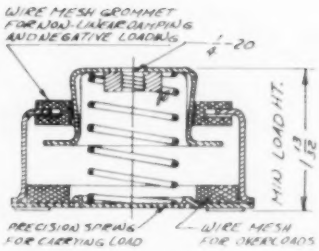
terials capable of withstanding most liquids and gases without deterioration, the company says. It adds that because of its basically simple design, the seal can be adapted to meet many extraordinary operating conditions and assembly problems.

Cartrisal Corp., 1449 W. Randolph St., Chicago 7.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PRECISION SPRING FOR CARRYING LOAD
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30G Shock Mounts

A new series of all-metal unit vibration isolators, said to have received Air Force approval and designed to cover load ranges from 10 to 150 lb., have been placed on the market by Federal Shock Mount Corp.

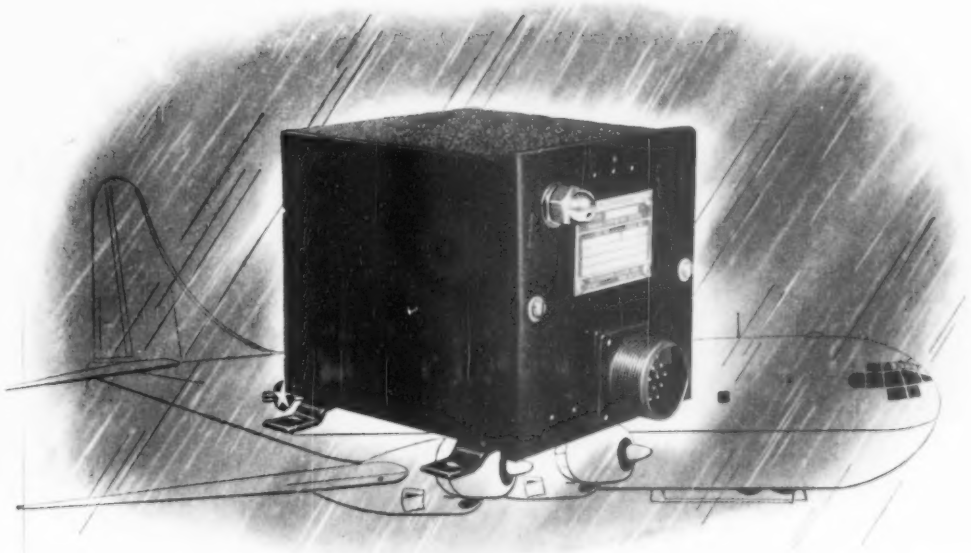
The parts are fabricated of aluminum alloy (caustic-dipped) in the lighter load ranges and in zinc-plated corrosion-resistant steel for heavier service. They meet JAN-C-172A requirements, according to the maker. Also, they are said to be ruggedly built to pass 30G drop tests covered in AN-E-19. Four of these mounts are furnished with standard or special size mounting bases. Load ranges are 10-22 lb., 18-40 lb., 25-50 lb., 32-64 lb., 40-80 lb., 55-110 lb., and 75-150 lb.

Federal Shock Mount Corp., 855 Morris Ave., New York 56.

ALSO ON THE MARKET

Shut-off valve protects gages in pneumatic and hydraulic systems. It cuts gage out of system when pressure goes too high, automatically opens gage to system when pressure drops. Available for systems ranging all the way from 50 to 5,000 psi. Sprague Engineering & Sales Corp., Gardena, Calif.

Relief grinder to handle wide variety of work—countersinks, center drills, integral, right or left hand pilot drills—has been put on the equipment shelf. The TGC relief grinder will handle work from ⅛ in. to 1 in. dia. with standard collets. The unit will speed up all types of cutter grinding operations by as much as 300%, according to the distributor, Western Aero Industries, 3305 Burton Ave., Burbank, Calif.



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Estimated Gross Revenues

Fiscal Years Ended June, 1951 to 1953

(Domestic Trunklines)

CARRIER	1951	1952 (000 omitted)	1953	INCREASE 1952 OVER 1951	INCREASE 1953 OVER 1951
American	$137,318	$156,791	$168,554	14.2%	22.7%
Eastern	87,134	99,096	107,163	14.4	23.0
TWA	86,269	98,278	105,679	13.9	22.5
United	103,221	120,870	129,933	17.1	25.9
Braniff	16,626	18,790	19,957	13.0	20.0
Capital	33,014	36,707	39,214	11.2	18.8
C&S	10,168	11,289	12,060	11.0	18.9
Delta	21,768	24,798	26,445	13.9	21.5
National	21,767	23,878	25,340	9.7	16.4
NorthWest	32,696	39,412	41,772	20.5	27.8
Western	12,189	13,887	14,611	13.9	19.9
Colonial	4,998	4,998	5,245	0.0	11.9
Continental	6,758	7,442	7,848	10.1	16.1
Inland	3,250	3,822	3,815	17.6	17.3
Mid-Continent	8,925	9,839	10,367	10.2	16.2
Northeast	6,945	7,653	8,012	10.2	15.4

SOURCE: Civil Aeronautics Board, Administrative Separation of Subsidy From Total Mail Payments to Domestic Air Carriers

CAB Takes a Look Into the Future

Board foresees gross revenue gains for all domestic trunks, but many factors can throw estimates way off.

The outset of a new year is open season for forecasts and projections. As the airlines finished 1951 with new peaks in many departments, including revenue passenger miles, gross revenues, and net profits, many quarters are predicting even greater accomplishments for the industry this year.

Forecasting airline industry results is an exceptionally hazardous undertaking. Few industries have more variable factors and are subject to as many external influences as are the airlines.

Instead of waiting for the new year for projections of future air transport operations, observers could have obtained an indication of predictions to come as advanced by the Civil Aeronautics Board last August. At that time, in order to effect an administrative separation of subsidy mail pay from total mail payments, the Board was forced to estimate future operations for the next three fiscal years. This was done for all of the domestic lines, trunks and locals.

The hazards of forecasting airline operations are revealed in the Board's estimates during 1945 where it established a 45-cent ton-mile rate for the Big Four. CAB's estimates and actual results for 1946 highlight how tenuous predictions in the air transport industry can become.

▶**Proof of the Pudding**—Here is how they turned out for the twelve months ended Dec. 31, 1946:

Instead of a projected profit of $5,997,000 for American, an operating loss of $318,315 was realized; Eastern's projected profit of $3,754,000 fell far short of the $8,221,876 profit actually realized; United's estimated profit of $3,459,000 turned into a deficit of $9,675,898.

At the time the original projections were advanced by CAB in 1945 there may have been a good and solid basis for expecting their fulfillment. Events in the industry, however, are fast moving and can alter a given situation almost overnight. Equipment delays and difficulties, completely unexpected, were primarily responsible for results far wide of the mark anticipated in 1945 by the Board.

▶**Predictions Exceeded**—To use another example, the strong growth qualities of air travel have amazed its most optimistic proponents. In June, 1950, the Port of New York Authority issued a well-documented and carefully prepared "Air Traffic Forecast," 1950 to 1980. This source projected a total of 11,066 million revenue passenger miles for all United States domestic airlines for 1955. But this total is estimated to have been exceeded during 1951.

At this rate, the estimate advanced by the Port Authority that domestic airlines in 1980 will account for 22 billion passenger miles of travel, may well be attained ahead of this time. Moreover, on this basis, the prediction from the same source that by 1970 air travel will exceed intercity rail travel, may now appear to be less questionable than when it was first advanced. This, of course, presumes that rail travel will continue its declining tendencies while airline volume will continue to expand.

Very few people, if any, would have been willing to admit a few years ago that Pullman rail travel—now most comparable to passenger air service—would one day be surpassed in volume by the latter. Yet this event took place in 1951 when the domestic trunk airlines flew an estimated 10.5 billion revenue passenger miles as compared with an estimated 10.1 billion for Pullman.

The tremendous strides made by air transportation become self-evident when it is realized that as recently as 1947 the ratio of air passenger miles to Pullman was only 49.03%. Going back to 1941 this ratio was only 13.75% and in 1936 but 4.64%. Of course, while air travel has been winning new converts and broadening its markets, Pullman travel has been losing ground.

▶**Shifting Bases**—In the light of recent trends, the Board's projections for the 1952 and 1953 fiscal years may appear to be on the conservative side. There is an almost uniform tone to the increases projected for the Big Four. The basis for this projection is difficult to follow in view of the wide variations in new equipment acquisition programs of the separate carriers. This further highlights the difficulty of forecasting airline results too far into the future.

The delay in equipment deliveries, such as now being experienced by a few carriers, can make for a considerable change. This is to say nothing of fast-moving events in the aeronautical art which may result in the introduction of more advanced aircraft such as jets or turboprops. Route re-alignments, consolidations or mergers can enter the picture. Rate structures for passengers, cargo and mail are also subject to change, and influence trends.

Then there is the course of the general business economy which influences the level of airline traffic. There are many other elements which make airline operations the least predictable among industry. Of course, this is to say nothing of the cost side of the operation equation which has fluctuating tendencies of its own with a bearing on ultimate earnings.

No pedantic course can be set too far into the future. Only by constant vigilance and close surveillance of trends can airline operations be followed with any degree of certainty.—**Selig Altschul**

AIR TRANSPORT

TWA Asks to Be Alone in Rome

But PAA says it is content with present route structure in CAB hearing on permanent Atlantic certificates.

Continuing their battle over the best international air transport routes of the world, Pan American World Airways and Trans World Airlines used just about every tactic in the book last week during hearings before Civil Aeronautics Board Chief Examiner Francis Brown in the trans-Atlantic route renewal case—battle of two airlines who now share U.S. trans-Atlantic traffic about equally.

TWA wants:

• **A permanent certificate.** Present TWA trans-Atlantic route authority is only temporary; it expires July 4.

• **Round-the-world route.** TWA wants a route extension from the Near East to Tokyo.

• **Eliminate PanAm from Paris, Rome.** TWA asks CAB to remove TWA's PanAm competition from Paris and Rome, but President Truman gave PanAm the France-Italy route, so that's probably more of a bargaining point than a serious request by TWA.

Pan American asks that the status quo remain. PanAm does not oppose permanent certification of TWA's trans-Atlantic route.

▶ **TWA Opens Up**—TWA President Ralph Damon and Chairman Warren Lee Pierson opened up with arguments for the points noted above. Then J. C. Stratton, TWA Director of Regulatory Proceedings, attacked PanAm's position with a barrage of statistics and assertions.

Stratton attacked the "threadbare claim" of PanAm that it is at a disadvantage because it has no domestic routes. He charged that PanAm has failed to make good its boastful claims of holding air traffic between the U.S. and Scandinavian countries by virtue of its merger with American Overseas Airlines.

Stratton asserted that after "swallowing up" AOA, Pan American "actually carried only 1,300 passengers between the U.S. and Scandinavia" the year after the merger, whereas AOA "carried 3,400 passengers for a full year period prior to its absorption by Pan American."

▶ **Tokyo Vital**—TWA wants its routes made permanent so it can make investments with more assurance. It wants extension to Tokyo not only to have a round-the-world route but also because it claims the world situation makes Tokyo a vital economic and strategic point deserving two-carrier U.S. service from Europe.

However, some observers said an apparent inconsistency in this argument is that TWA asks the Board to put PanAm out of France and Italy because the competition makes two-carrier U.S. service there "unrealistic" economically—although the U.S. carriers' Paris and Rome routes are more heavily traveled than Europe-Japan.)

▶ **TWA Strikes Back**—PanAm's Gen. Harold R. Harris, vice president of Atlantic operations, struck back at the TWA plan, saying, "They call their plan 'area competition' but what they want is an area from which competition is excluded. . . ."

"Furthermore, we should both stop this wrangling over routes and get out and sell more tickets," Harris said.

Points Harris made in favor of the present route are:

• **A traveler has choice** of two American-flag services to major European cities.

• **Present pattern** already has saved $7 million of subsidy the first year of operation since the President's AOA merger decision, PanAm asserts.

• **PAA and TWA have equal** access to European traffic, and both are gaining business.

CMA Seen Bar to Mexico Pact

U.S. tries to get direct route for EAL, but Mexican carrier has neither planes nor money to compete.

(*McGraw-Hill World News*)

Mexico City—A five-man U.S. delegation has returned to the United States after failing to reach a new route agreement with Mexico, at least for the time being.

The delegation, whose trip to Mexico was generally credited as the result of prodding from Eastern Air Lines' president Eddie Rickenbacker, consisted of Donald Nyrop, Chairman of CAB; Paul Barringer, of the U.S. State Department; David Stowe of the White House staff, and Gordon Bunn and Edward Bolster of CAB.

Neither the delegation, nor U.S. Ambassador William O'Dwyer, nor the Mexican participants were willing to disclose exactly what proposal was made, nor what happened.

▶ **Unofficial Report**—However, aeronautical circles in Mexico give this account. They said that Rickenbacker was pressing for his requested route extension from New Orleans directly to Mexico City. This would put him in competition with Pan American and American Airlines, the two U.S. carriers now flying between the U.S. and Mexico.

However, the New York via New Orleans route is more direct than New York via Dallas or New York via Houston routes now in service, and Eastern would undoubtedly cut heavily into American and PanAm if they got the New Orleans route.

The CAB delegation, asking for a Mexican approval for the Eastern flight to Mexico City, were prepared to grant an identical route to a Mexican carrier—presumably Pan American's affiliate, Compania Mexicana de Aviacion—according to the local reports.

▶ **CMA Throws a Block**—However, it was CMA which actually succeeded in blocking the Eastern certification to Mexico, it was said here. A CMA official was successful in convincing high Mexican government authorities that CMA was in no position to offer adequate competition to Eastern over a New Orleans route as it did not have the equipment nor the advertising budget to meet Eastern at this time.

Further, according to these unconfirmed reports, CMA would rather go along seeing its associate, Pan American, continue carrying New York-bound passengers to Houston where they are transferred, interestingly enough, principally to Eastern.

Pan American and CMA have been carrying 50-60,000 passengers to the U.S. annually, while American has been carrying 70-80,000. However, Mexico expects 500,000 tourists in 1952 and both airlines will undoubtedly carry more than ever in the coming year. Eastern would like to have a cut in this rapidly growing business.

It was understood that the U.S. delegation left a final proposal with the Mexican authorities, embodying unknown terms but undoubtedly including a route for Eastern, and that the Mexicans promised to give it further consideration. However, local observers concluded that there would be no change in status quo for the foreseeable future in Mexican commercial air.

Also important to the negotiations was the U. S. plea for a regular bilateral air treaty under the "Bermuda principles" of freedom of scheduling. But Mexico stood fast on her avowed right to control flight frequency across her boundary. The delegation also sought Mexican approval of Western Air Lines' Los Angeles-Mexico City route.

Pilot Strike Threat Stumps Mediators

Pan American's long-time pilots have stumped the government labor relations experts by threatening to strike if Pan American carries out a government order issued by the Civil Aeronautics Board. The National Mediation Board admits it doesn't know what to do right off.

The PanAm pilots plan to strike if the company follows the employe seniority formula CAB ordered it to follow to integrate original PanAm pilots with those of the PanAm-merged American Overseas Airways.

The Civil Aeronautics Board issued this order recently—specifying a seniority integration formula for PAA and AOA pilots, after the pilots themselves and PanAm management could not agree.

Now the question is: How can National Mediation Board mediate between pilots employed by an airline and a government agency that issued that airline an order the pilots don't like?

Some officials said that a plan might be worked out by next week, after the complete National Mediation Board returns to Washington from other duties.

The CAB seniority formula gave pilots of the merged airline seniority for all past airline experience, not just experience with the merged airline.

Air France Strikers Return to Work

(*McGraw-Hill World News*)

Paris—Air France has resumed its normal flight schedule after a ten-day strike of the carrier's 1,500 pilots, navigators and flight mechanics that cost the line an estimated $1.5 million in fares and disrupted holiday air traffic to and from Paris.

The flight crews agreed to cut short their scheduled 20-day strike for 66% pay boost and 30% bonus increases on assurances from the Ministry of Transport that negotiations between their union and Air France be arranged.

The strikers got very little public sympathy since air crews are exceedingly well paid by French standards. Present pay scales range from 70,000 francs a month ($200) for a flight mechanic to 300,000 francs a month ($875) for a trans-ocean pilot as compared with

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City ..... State .....

Present Position ..... Working Hours ..... A.M. to ..... P.M.

Employed by .....

about 35,000 francs a month ($100) for a civil servant, factory foreman or white collar worker.

The strike began Dec. 21 and was slated to continue until Jan. 9. By Jan. 3, however, traffic was normal on all Air France lines.

Pilot Groups Meet In Sydney in April

(*McGraw-Hill World News*)

Melbourne—The seventh annual congress of the International Federation of Airline Pilots' Assns. will take place in Sydney, Australia, in April, 1952.

At least 25 delegates from 16 countries are expected and discussions at the Congress will center on flying safety, operational methods and advancement of the profession.

Some of the smaller associations, such as those in Ireland, Belgium, Sweden, etc., are finding the financial commitments in connection with sending of the delegates a problem, but the help of several airlines serving Australia is expected to be available, and they may get free travel to and from Australia.

TCA Maintains Family Ties

A plan that will permit couples and families to sit together when traveling by air has been tried out by Trans-Canada Air Lines on its North Atlantic service. It will next be extended to cover its international run to the West Indies, and later will go into effect on the carrier's domestic routes.

Passengers are given combined gate passes and seating cards at the airport ticket counter. When boarding the aircraft they are shown to their seats. A souvenir card bearing the passenger's name, destination, flight number and diagram of plane's seating plan is to be issued in the near future.

NZNAC Shows Big Air Freight Gain

(*McGraw-Hill World News*)

Melbourne—New Zealand National Airways Corp. showed an 83% gain in scheduled freight in its last fiscal year over the previous comparable period, the current figure being 6,641,031 lb. On charter flights the carrier hauled 1,150,278 lb., an 86.6% gain over previous figures.

Passengers also were in the recent tally, to 238,405, a 16% increase. This improved business has considerably improved the airline's financial picture, although the large deficit incurred in previous years has yet to be cleaned up. More modern equipment is credited for the better showing.

Last year's scheduled route mileage was 4,797,253.

Flight Engineers Join New Union

United Air Lines flight engineers have voted 182-10 to disassociate from Air Line Pilots Assn. and have chosen the recently formed Flight Engineers International Assn. as their union. National Mediation Board has certified FEIA as the new bargaining agent for United's flight engineers.

The United engineers will continue to work under the existing working agreement until Feb. 1, when the new union plans to re-negotiate the contract under its own title. Meanwhile, the FEIA has taken over the United flight engineers' application for government approval of a wage raise negotiated last Feb. 9, now subject to approval by the airline and Railway Wage Panel.

A tally of flight engineer labor contract status shows:

• **FEIA flight engineers.** Chicago and Southern, contract runs to Mar. 1, 1953; Eastern, in mediation now; National, runs to Mar. 20; Pan American, runs to the end of next year; TWA, runs to Apr. 30; United, runs to Feb. 1.

• **Non-FEIA flight engineers.** Northwest, in negotiation; American in negotiation.

Air Line Pilots Assn. has passed a resolution that it does not oppose FEIA becoming American Airlines flight engineers' union. ALPA President Sayen is reported by FEIA as saying "ALPA will not perpetuate its Air Carrier Flight Engineer Assn." A pilot resolution also urges FEIA to join with other airline labor groups to form an Airline Labor Executives Assn., similar to the Railway Labor Executives Assn.

Editorials of the first two issues of "The Flight Engineer," the union's monthly newsletter, included two statements that appear to show the primary aims of the union:

• **Safety.** "If all of the reasons for a flight engineer's existence are reduced to one reason, that reason is safety."

• **Pay.** "When we get our money slice of the flight crew pie, it will be much larger than the present approximate 50% of the captain's pay."

Able, Baker, Now Alfa, Bravo

New phonetic alphabet has been officially adopted by the International Civil Aviation Organization for use by pilots in voice communications, replacing the

previous A for Able, B for Baker, C for Charlie series.

The new code became effective Nov. 1, 1951, although the present alphabet may be used until Oct. 1, 1952 if requested by the pilot.

Here's the complete new code:

A–Alfa, B–Bravo, C–Coca, D–Delta, E–Echo, F–Foxtrot, G–Golf, H–Hotel, I–India, J–Juliett, K–Kilo (kee-lo), L–Lima (Lee-ma), M–Metro (as in English, or May-tro), N–Nectar, O–Oscar, P–Papa (equal emphasis on syllables), Q–Quebec (Kibbeck), R–Romeo, S–Sierra (See-erra), T–Tango, U–Union (as in English, or Oonion), V–Victor, W–Whiskey, X–Extra, Y–Yankee, Z–Zulu.

University Offers Airline Courses

Training courses for ground school instructors, air traffic controllers and commercial pilots are being offered by New York University.

Airline personnel will give most of the instruction in air traffic control, meteorology, ground and aircraft radio, radio code, air navigation, practical dispatching, aircraft engines, CAR, aircraft loading, elementary theory of flight and aerodynamics.

Registration will be held Feb. 1-2; classes start after 6 p.m. Feb. 4. Information may be had from Prof. Roland H. Spaulding, Barney Bldg., 34 Stuyvesant St., New York 3.

SHORTLINES

► **Alaska Helicopters** is a new company formed by purchase of Alaska Airlines copter division by Rick Helicopters president James S. Ricklefs. Rick now operates eight Bell copters, including the new Alaska Helicopters' three based at Merrill Field, Anchorage.

► **Australia** has started construction of a "major aerodrome" at Cocos Island in the Indian Ocean for a new Australia-South Africa route.

► **Braniff Airways** has flown over 1,800,000,000 safe passenger miles. . . . Perfect 1951 safety record entitles it to its 19th annual flight safety award by National Safety Council.

► **British Overseas Airways** increased revenue passenger miles by 45% to 762,357,400 and cargo 12% to 8,780 short tons in 1951 over 1950.

► **California Eastern Airways** has bought three instrument and electronics firms: London Instrument Co., Chicago; Oak-

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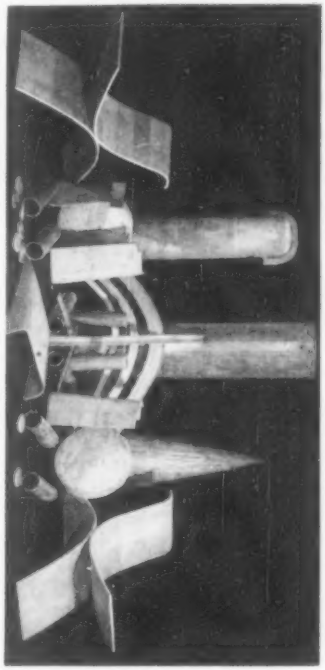

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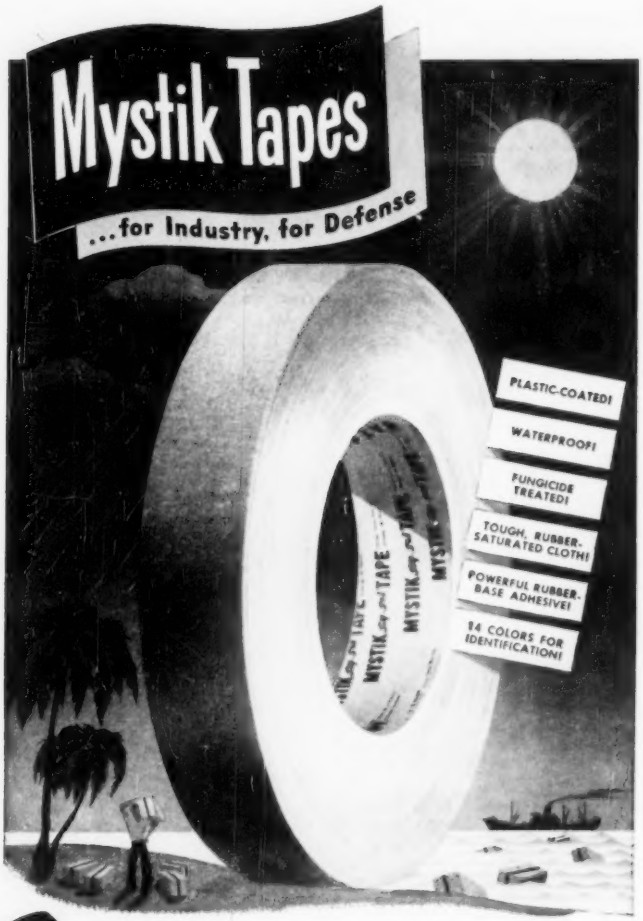

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land Aircraft Instrument Service and Land-Air, Inc., Chicago.

► **Civil Aeronautics Administration** reports the U. S. airlines fleet Nov. 30 included: 147 Douglas DC-6s, 247 Douglas DC-4s, 503 Douglas DC-3s, 114 Lockheed Constellations, 31 Martin 2-0-2s, 45 Boeing Stratocruisers, 116 Convair 240s, 147 Curtiss C-46s, and 52 miscellaneous types—grand total of 1,402 U. S. airliners currently in operation.

► **Civil Aeronautics Board** has consolidated the trans-Atlantic mail rate cases of TWA and Pan American.

► **Delta Air Lines** passenger miles gained 44% to 405,040,000 in 1951 over 1950.

► **Independent Military Air Transport Assn.** has appointed Ben B. Edwards of Overseas National Airways as executive director of the Assn.; he will operate its business affairs in IMATA's Washington office at 1025 Conn. Ave., N. W., suite 411-A.

► **International Civil Aviation Organization** reports 1951 passenger kilometers flown by the world's scheduled airlines gained 25% to 34 billion, excluding Russia and China. That is 24 times the 1937 traffic and almost double 1947 . . . Cargo gained 19% over 1950 to 900 cargo ton kilometers—triple the 1947 volume.

► **KLM Royal Dutch Airlines** reports that in 1951 "KLM flew more export tonnage overseas than any other airline, thereby making them the 'air cargo leader' across the Atlantic."

► **National Airlines** says its 14 Convair 340s on order will speed service to intermediate cities by an average of 22%. With the eight DC-6Bs on order they will increase available seat miles by 15%.

► **Pan American World Airways** confirms it will start air coach over the Pacific this year, as well as Atlantic . . . Says it is "continuing its jet airplane development program with a continuing search both at home and abroad for a jet plane (with) . . . range, dependability and low cost of operation." . . . Carried 1,289,000 passengers and 77,059,000 lb. cargo in 1951, up 27% and 39% respectively from 1950 . . . Subsidiary has bought the 300-room Hotel Reforma in Mexico City.

► **Scandinavian Airlines System** says it has cut European visa paperwork to the point where company has been able to eliminate the previously required pre-flight check in the morning of flight

day; questionnaire length is cut from ten to 2½ inches.

▶ **Trans-Canada Air Lines** flew 980,000 passengers in 1951, up 18% from 1950; cargo and express gained 15% to 5,200,000 ton-miles.

▶ **Transportation Assn. of America** estimates Americans spent over $50 billion on transportation of goods and persons in 1951.

▶ **Trans World Airlines** last week started scheduled passenger service with its new Martin 4-0-4s, connecting Kansas City, New York and Washington via 10 intermediate cities. TWA will get 40 altogether. . . . Starts daily trans-Atlantic air coach May 1. . . . Offers two-week package tour to London for $618. . . . Predicts a 50% gain in trans-Atlantic travel this year to about a half million passengers. . . . Says CAB's "public counsel lauded TWA for submitting forecasts of 1953 traffic and sharply criticized Pan American World Airways for failing to furnish forecasts." . . . Will start progressive maintenance on the Martin 4-0-4, eliminating the former lengthy 10,000-hour check, and will extend the system to its 66 Constellations later. . . . Reports renovation of the flooded Kansas City maintenance base will speed parts handling up to 25%.

▶ **United Air Lines** says it will serve about 4 million meals aloft on its airline this year, up 20% from 1951 and about 30% from 1950—based on predicted gains in luxury service passenger miles. . . . Hasn't announced its predicted air coach traffic for 1952. . . . Reports machines and machine parts replaced cut flowers as its leading commodity carried in 1951, by weight.

▶ **U. S. Airlines** has started reserved-space service on its north-south all-cargo flights, guaranteeing customers one-day service.

▶ **Washington's Burke Airport** project construction start is reported delayed at least six months for lack of funds. Congress has granted $1 million to date for the estimated $14-million project, formerly scheduled to start construction this spring.

▶ **Weather Bureau** reports pilots are using its new continuous weather broadcasts in the New York area more and more; the system is helping pilots directly, and has cut delays due to the Bureau's "busy telephone" problem in bad weather, Bureau says.

▶ **West Coast Airlines** mail pay "appears to have become excessive," CAB says. The Board plans to reduce it.

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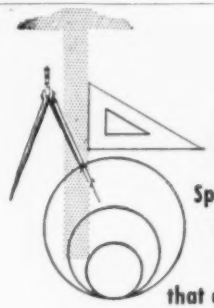

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P-2631, Aviation Week
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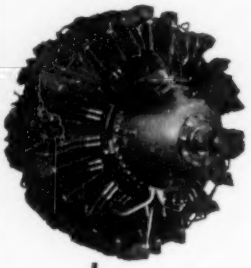

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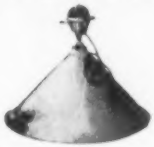

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90	1685HAR	Holley carburetor
19	1375F	Holley carburetor
407	SF9LN-2 (manufacturer's part No. 10-12453-6 Spec. AN9511)	Bendix Scintilla Magneto
49	SF5RN-12 (manufacturer's part No. 10-26170-1)	Bendix Scintilla Magneto
185,000	LS4AD1	Spark Plug (Aero)
30,000	LS-659A	Bendix Scintilla Spark Plug

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814	35814	Blower Ass'y
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56	48392	Sump
390	48461	Gear
78	76236	Gear
1178	84289	Bearing
113	84487	Housing
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700	TFD 8600	Thompson	Fuel Booster
125	D7818	Adel	Anti-icer
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250	AN4014	Erie Meter	Wobble (D-1)
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1000	AN5780-2	G. E.	Wheel & Flap Position Indicator
400	AN5780-2	Weston	Same as above
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10	46B2	Lewis Eng.	Air Temp. Ind.
31	47B21	Lewis Eng.	Temperature Ind.
12	47B22	Lewis Eng.	Temperature Ind.
20	47B23	Lewis Eng.	Temperature Ind.
36	47B24	Lewis Eng.	Temperature Ind.
10	76Z2	Lewis Eng.	Air Temp. Ind.
11	76B4	Lewis Eng.	Temperature Ind.
20	77C4	Lewis Eng.	Temperature Ind.
21	77C5	Lewis Eng.	Temperature Ind.
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11	450-0	Skinner	Gasoline Filter
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85	12994-2	Adel	Lock Valve
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11	UA-6012K-S30K	United Air Prod.	Oil Temp. Reg. 12°

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COCKPIT VIEWPOINT

By Capt. R. C. Robson

Clean, Fresh and Hot

Coffee probably comes as close to being the "Great American Drink" as anything else. It serves both as the morning eye-opener and to close out the midnight snack. Restaurants gain or lose customers according to the potency of their brew and the demi-tasse is the piece de resistance after a hearty meal.

► **Java in Dutch**—In view of such prominence one would think that Americans would take considerable pains to see that their coffee was of the best. Unfortunately most of the coffee served in the U. S. indicates labor in the opposite direction.

High on the list of offenders are the airlines. Probably no other class of servers dispenses such consistently vile brew as do the buffets of our modern transports.

The reason of course lies with the method. Airline coffee is made in quantity, then placed in thermos jugs aboard the aircraft. But in this seemingly simple process lurk many booby traps and apparently the caterers manage to stumble into each.

It does not come out, as good coffee should, clean, fresh and hot.

Cleaning a thermos is admittedly a difficult task. But several layers of rancid coffee bean oil produce a drink that is difficult to relish. A simple 30-second test can be made here. Taste some water from a thermos. If it tastes like oil then pity the next batch of coffee. So several minutes spent with soap and hot water will do wonders for our first essential—cleanliness.

► **Better Be Fresh**—The brew must also be of recent vintage. An example here is the general practice of caterers to have the midnight shift make coffee for morning flights. By sunrise, through constant distilling in the urn, the brew has reached a potency just short of atomic.

Having fallen down on the first two items, caterers will attempt to erase these mistakes by putting all the fires of hell beneath their urn. But they have reckoned without the airline thermos. So by the time this stew reaches the lips it may be boiling, lukewarm or frozen, depending upon the condition of the thermos, its heating elements and the time spent in transit to the airplane.

It is this nectar that says "Good Morning" to early commuters on the airlines.

► **Urnest Criticism**—In all fairness it should be added that this condition does not last all day. The appearance of the General Foreman at the Brewery causes a considerable increase in the miles per gallon received from each pound of coffee per urn. Well-seasoned travelers therefore note an alarming reduction in strength per cup as the day wears on. Towards dawn of course, the consistency again thickens.

It is from this cycle that we get the term "die-urnal."

There has been no necessity of late to woo passengers to the airlines. The laws of natural selection have produced a bumper crop of ticket buyers. Some ticket sellers may therefore be inclined to scoff at small measures to improve the attractions on their airline.

We think however, that passengers might react favorably to "the best cup of airborne coffee." After all, many places have become famous as the result of one small specialty. At least this idea would be different among the airlines.

To be doubly sure our basic premise was not wrong, we checked with one who should know. From the land where they grow it, we asked Brazilian airline pilot, Captain A. A. Cequira for his opinion of U. S. coffee. With due regard to Good Neighborliness we pass on his remark: "This is coffee???"

WHAT'S NEW

New Books

Resistance Welding Data Book, fourth edition, over 500 pages, 1,000 illustrations, prepared by P. R. Mallory & Co. engineers and metallurgists, price $5. Available from the company's Welding division, Indianapolis 6.

Comprehensive text has been completely revised and rewritten and is the first new edition to be published by the firm in seven years.

Chapters include: spot, projection, seam, flash and upset butt welding, metals to be welded, resistance welding electrodes, dies and holders, recommended practices, and standard testing methods.

The Making, Shaping and Testing of Steel, sixth edition, based on text by J. M. Camp and C. B. Francis 1,435 pages, cross-reference index, 713 illustrations. Published on a non-profit basis, price $7.50; $5 for schools and colleges. Order from the Treasurer, United States Steel Co., 525 William Penn Pl., Pittsburgh 30.

This standard reference of steelmakers has been updated to include the latest technological gains of the past decade, faster steel-making methods developed, and the revision of compositions made necessary to conserve alloys for defense.

The work of well-known workers in the field has been included, for example, in the heat treatment section there are the contributions made by Bain, Davenport, Grossman and others who reduced the art to a science. Then there is the research done by Dr. J. B. Austin and his collegues on thermodynamics, heat flow and ceramics at U. S. Steel's Kearney Research Laboratory.

New Faces & Places

U. S. Airlines, Inc., has opened new general offices at 500 Fifth Ave., New York 36. Phone is LAckawanna 4-0850.

Mathematical Computing Service is a new group organized to perform applied mathematics services for industries and universities desiring complex engineering calculations and related work in the aviation field. MCS is located at 105 Court St., Room 604, Brooklyn 2, N. Y. Phone is MAin 5-2309. J. L. Miller is manager of the group.

Jim Welsch Aircraft Sales has been formed to handle new and used single- and multi-engine planes, also aircraft parts and accessories. Address is Lincoln Bldg., 60 E. 42 St., New York 17, Suite 650. Phone is MUrray Hill 7-5854.

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EDITORIAL

Industry Isn't Holding the Bag

Let's go back to a speech by President Truman, made Dec. 15, 1950. He said, "within one year we will be turning out planes at five times the present rate of production."

This was obviously impossible to aviation people, although very few of them said so publicly.

Later, someone in the White House circle had to "amplify" what Mr. Truman really meant. It seemed, on more mature thinking, that what he really intended to say was that our aircraft capacity—or production rate—would be up five times in a year.

This didn't make much sense either, to aviation people.

At this time (Jan. 1, 1951) AVIATION WEEK published on this page the prophetic, wise words of United Aircraft Corp.'s President H. M. Horner. He was the only top aircraft industry leader we found who would comment for publication on Mr. Truman's words.

Mr. Horner said:

"A five-fold increase in aircraft engine production within a year simply is not in the deck. Given no delay in manpower, given access to all the necessary materials and given all the machine tools we will need, the very best we can do in one year is a three-fold increase in power plant production. If we have absolutely no bottlenecks we can reach a seven-fold production increase two years from now. In the third year, after we have brought in the automotive manufacturers as licensees, and established satellite plants and trained our working force, then we can produce whatever the economy can stand. . . ."

As everyone now knows, the industry wasn't given access to its necessary materials, it wasn't given a fraction of the machine tools it needed, it wasn't given binding instructions that didn't change frequently.

So our aircraft production output was less than 5,000 instead of Mr. Truman's goal of 15,000, and the monthly rate of aircraft production little more than doubled in one year.

If it had not been for a few people like Jack Horner, and publicity some of the press gave such realistic statements at the time, we would probably find the aircraft industry holding the bag for today's publicized failures to meet schedules.

Mr. Horner's brand of far-seeing press and public relations has paid off in this particular situation. The industry could take a lesson in seeing how a forthright statement of fact, though perhaps unpopular or "indelicate" at the moment, has helped it keep out of an undeserved doghouse a year later.

From a Mechanic's Heart

It isn't often a mechanic writes a letter, although we know many read AVIATION WEEK. But we received one the other day that deserves publication and distribution to the widest possible audience.

We are proud to print it, exactly as it came to us. It speaks for itself. It says:

> Dear Editor:
>
> It seems appropriate . . . when people . . . are making resolutions that we aircraft mechanics re-examine our duty to the industry.
>
> Some of our rank and file foolishly assume to overemphasize our responsibility regarding delays and on-time departures. Airworthiness alone should be the only consideration. The ability to say, "We never lost an aircraft because of anything remotely connected with poor maintenance," is much more impressive than any amount of charts and graphs of plant utilization, percentage of on-time departures, etc.
>
> T. R. SANDERS
> Thompsonville, Conn.

A Public Service

Some 400,000 persons who use air travel cards will soon find added value in these symbols of credit accounts with the 26 airline members of the Air Transport Assn.

A joint announcement of ATA and the American Hotel Assn. says more than 1,250 leading hotels in the United States have agreed to honor the cards, not only for accommodations and meals, but for other hotel services that are customarily charged against guests' room accounts.

It appears likely that even more of the AHA's total membership of about 6,000 hotels may come into the fold later.

AHA points out that the air travel card goes a long way toward meeting a long-felt public demand for some universal type of credit card identification which can be recognized by hotels across the country.

M. F. Redfern, vice president of ATA, made the announcement on behalf of the airlines. It is understood that two or three airlines, including American and TWA, made original arrangements with hotels to honor cards, but it was soon realized that there would be too much confusion and misunderstanding by both card holders and hotels if the plan applied only to a few cards. The average card holder doesn't know which airline issued his particular card.

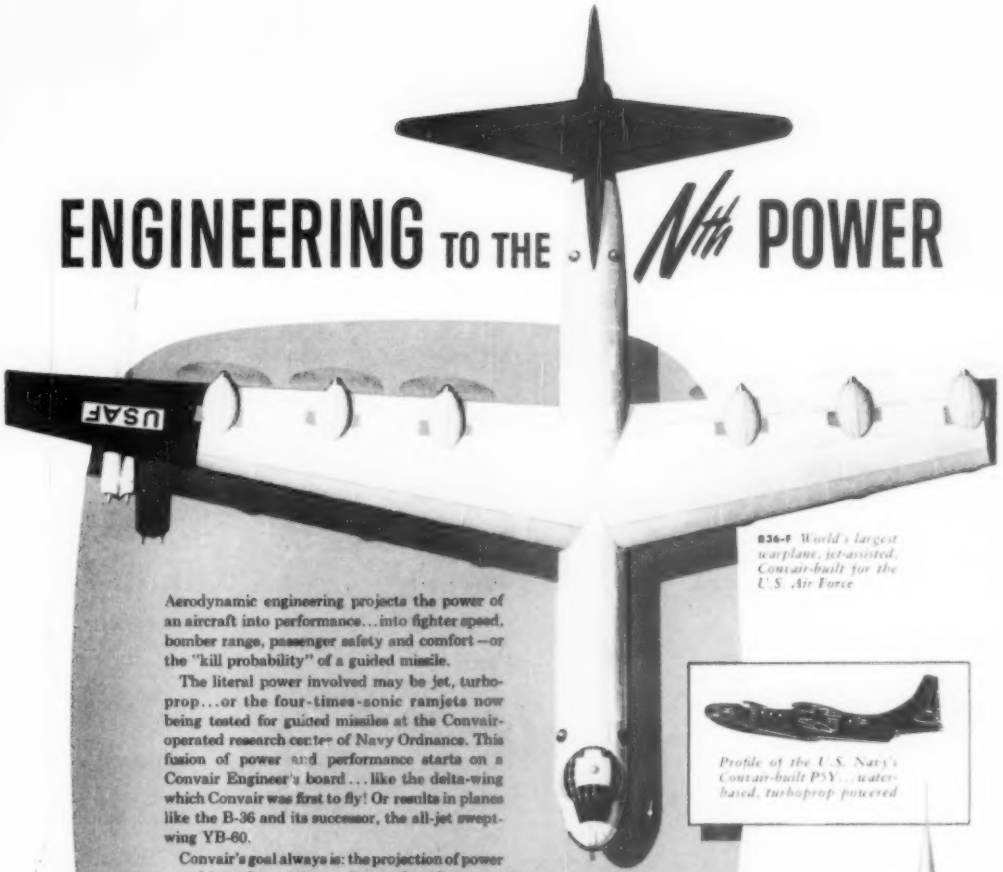
This plan, while it will probably have some growing pains, appears to be a great step toward better public service, and everyone connected with this expansion of the air travel card's utility deserves warmest commendation and applause.

It is worth noting that several railroads tried a railroad credit card for a time but they abandoned it after a little more than a year. Aviation is not only making its credit cards work on all 26 ATA airlines; it is vastly expanding their cards' usefulness beyond mere transportation itself.

Good Work.

—Robert H. Wood

ENGINEERING TO THE *Nth* POWER



B36-F *World's largest warplane, jet-assisted, Convair-built for the U.S. Air Force*

Aerodynamic engineering projects the power of an aircraft into performance... into fighter speed, bomber range, passenger safety and comfort—or the "kill probability" of a guided missile.

The literal power involved may be jet, turbo-prop... or the four-times-sonic ramjets now being tested for guided missiles at the Convair-operated research center of Navy Ordnance. This fusion of power and performance starts on a Convair Engineer's board... like the delta-wing which Convair was first to fly! Or results in planes like the B-36 and its successor, the all-jet swept-wing YB-60.

Convair's goal always is: the projection of power to achieve the *maximum degree* of performance. The maximum, the Nth degree of air power... *the Nth Power!*

Profile of the U.S. Navy's Convair-built P5Y... water-based, turboprop-powered

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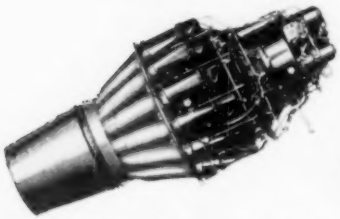
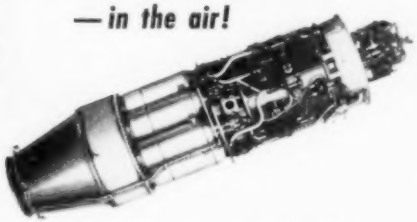
- The only jet engines which our armed services have actually operated 1,000 hours without a major overhaul are an Allison J33 and an Allison J35. They were finally removed only for routine inspection.
- One other Allison J33 has passed 900 hours and is fast approaching the 1,000-hour mark. Another J33 has exceeded 750 hours in combat.
- Many Allison jet engines have exceeded 500 hours without ever being removed from the aircraft.
- Allison jet engines were first to accumulate a total of more than 1,200,000 hours in the air.
- More than 700,000 hours were piled up during the last year in military service from Korea to Germany.
- Allison jet engines have always set the pace for allowable hours before overhaul.

No other jet engine in the world can equal this record of experience — where it counts most — in the air!



Allison J33 engine powering Lockheed Shooting Stars, F-94's and Grumman Panthers



Allison J35 engine powering Republic Thunderjets and Northrop Scorpions.

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Builders of J35 Axial, J33 Centrifugal Flow Turbo-Jet Engines, T38 and T40 Turbo-Prop Engines